Volume III Annex C.4

Heritage Impact Assessment Report

Version 5.0

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LIST OF APPENDICESS

LIST OF ACRONYMS

Abbreviation	Full Definition
AIA	Archaeological Impact Assessment
BA	Bachelor of Arts
BP	Before Present
BSc	Bachelor of Science
CRM	Cultural Resources Management
EA	Environmental Authorization
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERM	Environmental Resources Management
ESA	Early Stone Age
ESIA	Environmental and Social Impact Assessment
HIA	Heritage Impact Assessment
HRA	Heritage Resources Authority
HRM	Heritage Resources Management
GNR	Government Notice Regulation
GRP	Grave Relocation Process
GS-IDP	Gert Sibanda Integrated Development Plan
I&APs	Interested and Affected Parties
ICOMOS	International Council on Monuments and Sites
IDP	Integrated Development Plan
Ka	Thousand years ago
LoM	Life of Mine
LSA	Later Stone Age
MGDP	Mpumalanga Growth and Development Plan
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA	Middle Stone Age
MSc	Master of Science
Mtpa	Million tons per annum
Mya	Million years ago
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMPA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
OES	Ostrich eggshell
OHTL	Overhead Transmission Line
PHRA	Provincial Heritage Resources Authority
PIA	Palaeontological Impact Assessment
RoD	Record of Decision
RoM	Run of Mine
SACNASP	South African Council for Natural Scientific Professionals
SAHRA	South African Heritage Resources Agency
SAPS	South African Police Service
SoW	Scope of Work
ToR	Term of Reference
VIA	Visual Impact Assessment
WHCA	World Heritage Convention Act, 1999 (Act No. 49 of 1999)

1 INTRODUCTION

1.1 BACKGROUND

Kangra Coal (Pty) Ltd commissioned Environmental Resources Management Southern Africa (Pty) Ltd (ERM) to conduct an Environmental and Social Impact Assessment (ESIA) for the proposed Kusipongo Resource Mining Expansion Project (proposed Project) in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). ERM subsequently appointed Digby Wells Environmental (Digby Wells) to conduct the Heritage Impact Assessment (HIA), which is one of the specialist studies required for the ESIA.

The proposed Project is situated near Ermelo in the Mpumalanga Province. The regional setting of the Project Area is illustrated in *Figure 1.2*.

1.2 TERMS OF REFERENCE

1.2.1 Heritage Resources Assessment Terms of Reference

ERM completed a Scoping Report in terms of the MPRDA and NEMA and submitted this report SAHRA. Subsequently, SAHRA commented on the Scoping Report in a letter dated 22 January 2013 and stipulated that a HIA must be completed. The HIA needs to include:

- An Archaeological Impact Assessment (AIA);
- A palaeontological study; and
- An assessment of impacts of the proposed development on any other heritage resources such as built structures over 60 years old, sites of cultural significance associated with oral histories, burial grounds and graves, graves of victims of conflict, and significant cultural landscapes or viewscapes must also be assessed.

1.2.2 Scope of Work

As per the specialists Scope of Work (SoW) and to comply with the above-mentioned Terms of Reference (ToR), the following heritage work was required and is now presented in this HIA report:

- Collation of a heritage Baseline Section inclusive of:
    - A literature review;
    - Archival and relevant database research;

- An update and integration of previous heritage baseline reports;
- A cartographic survey and historical layering; and
- An institutional and legal review.

- A collation of a HIA Section inclusive of:

  - Fieldwork;
  - An integration of specialist studies;
  - Statement of heritage value; and
  - An impact assessment.

1.2.3 Aims and Objectives

The aim of this HIA was to assist the client in identifying, documenting and managing heritage resources found in the proposed Project Area in a responsible manner and in compliance with relevant legislative frameworks. The specific objectives of the study were to:

- Identify, record and document sites of cultural significance, archaeological, palaeontological, cultural and historic sites including graves and cemeteries within the proposed Project Area;

- Evaluate whether proposed activities will have any negative impacts on these heritage resources during the construction, operation and decommissioning phases of the proposed Project;

- Recommend Project-related mitigation and management measures to avoid or ameliorate any negative impacts on structures, objects or sites of cultural significance. Where Project-related mitigation may not reduce impacts, appropriate mitigation of heritage resources were recommended; and

- Promote the overall conservation and protection of natural and cultural resources in the proposed Project area and its surroundings.

1.3 PROJECT DESCRIPTION

1.3.1 Current Operations

Kangra Coal have been mining and washing coal at the Savemore Colliery adjacent to the Driefontein community since the late 1990s. The Savemore Colliery currently operates on three properties:

- Maquasa East;
- Maquasa West; and
- Maquasa West Extension.

Both underground and open pit mining methods characterise current operations at the Savemore Colliery. Production is less than five million tons per annum (Mtpa) and Run of Mine (RoM) comprises 70% product and 30% discard. At present, mined coal is transported to the washing plant by means of a conveyor. The expected remaining life of the current mining operations is estimated to be a further three to five years.

1.3.2 Description of the Proposed Project

The scope of the proposed Project involves the development of an underground working in the Kusipongo Resource with associated surface infrastructure at the Main Mine Adit (Adit A), which is situated westwards of existing operations, a ventilation Adit (Adit B), and a new overland conveyor system.

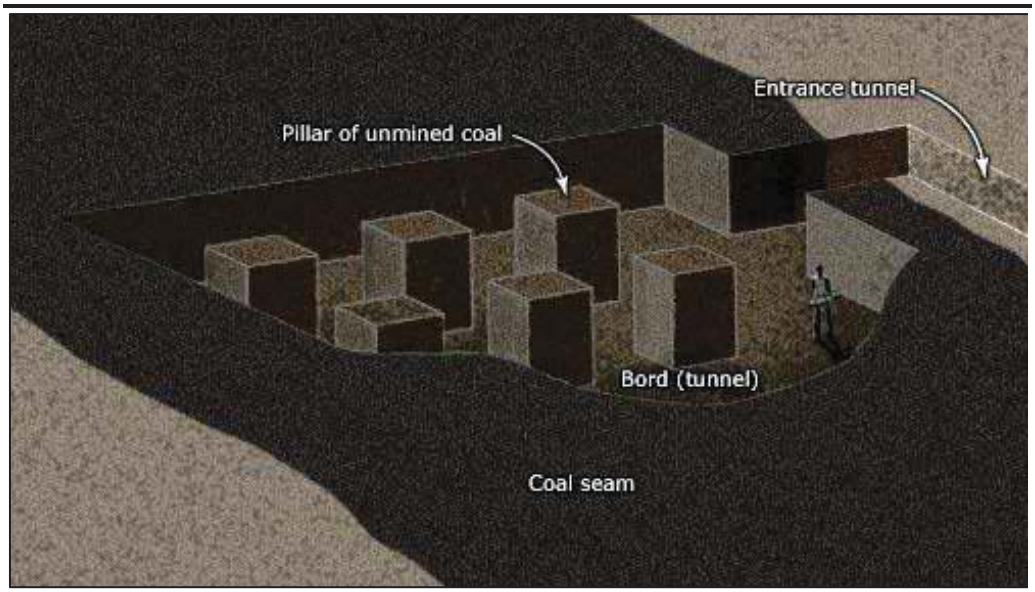
The proposed Main Mine Adit, Adit B and the overland conveyor route will be located on the following farm portions (*Table 1.1*):

Table 1.1 Farm Portions within the Footprint of the Proposed Project

Property	Title Deed Number
Adit A	
Donkerhoek No. 14-HT, Portion 4	T102893/2005
Twyfelhoek No. 379-IT, Portion 3	T53617/1998
Twyfelhoek No. 379-IT, Portion 2	T53617/1998
Adit B	
Kransbank No. 15-HT, Portion 2	T16193/1989
Kransbank No. 15-HT, Portion Remainder	T16193/1989
Conveyor Route	
Twyfelhoek No. 379-IT, Portion 3	T53617/1998
Twyfelhoek No.379-IT, Portion 2Re	T53617/1998
Twyfelhoek No.379-IT, Remainder	T53617/1998
Nooitgezien No. 381-IT, Remainder	T36896/2006
Rooikop No. 18-HT, Remainder	T78816/2004

The proposed Project will be restricted to underground mining. The anticipated RoM production volume is expected to be between approximately 3.6 Mtpa and 3.8 Mtpa, should both seams be mined concurrently. The proposed Project is estimated to have a lifespan of approximately 10 to 20 years. The means of underground mining will employ bord and pillar methods, using continuous mining equipment (*Figure 1.1*).

Figure 1.1 Schematic Example of Proposed Underground Bord and Pillar Mining Method



Source: (www.teara.gov.nz/en/coal-and-coal-mining/6/2)

The majority of the surface infrastructure associated with the proposed Project, such as a coal beneficiation plant and material handling facilities, is located on the existing Maquasa East, Maquasa West and Maquasa West Extension properties. This infrastructure will continue to be used for the processing of coal reserves from the proposed Kusipongo Resource. It is proposed to transport coal via an overland conveyor from the proposed Main Mine Adit in the Kusipongo Resource to the existing Maquasa West Adit. From there it is proposed that the new overland conveyor system will feed into the existing overland conveyor system, which will then transport coal to the existing Maquasa East Coal beneficiation plant. Included in the proposed conveyor corridor will be overhead transmission lines (OHTL), a gravel service road and a security fence (fenced width of 32 m).

1.4 EXPERTISE OF CULTURAL HERITAGE SPECIALISTS

Johan Nel has completed a Bachelor of Arts (BA) degree in archaeology and anthropology and a BA Honours degree in archaeology at the University of Pretoria. He has over 10 years' experience in Cultural Resources Management (CRM) as a consulting archaeologist. Johan holds the position of Unit Manager for Heritage Resource Management (HRM) in the Social Science Department at Digby Wells. Johan is a member of the Association of Southern African Professional Archaeologists (ASAPA).

Shahzaadee Karodia has completed a BA degree in archaeology and anthropology, a Bachelor of Science (BSc) Honours degree in palaeontology, and a Master of Science (MSc) degree in archaeology. Shahzaadee has academic experience n palaeoanthropology and historical archaeology. She currently holds the position of Archaeology Consultant at Digby Wells. Shahzaadee is a member of ASAPA.

See *Appendix A* for specialists Curriculum Vitae.

1.5 CLIENT, CONSULTANT AND LAND OWNER CONTACT DETAILS

The contact details of the client, consultant and landowners are presented respectively below.

Table 1.2 Client Contact Details

ITEM	COMPANY CONTACT DETAILS
Company	Kangra Coal (Pty) Ltd
Contact person	Mr Marcos Moledo
Tel no	011 684 0149
Cell no	082 861 1331
E-mail address	marcos@kangracoal.co.za
Postal address	5 De Wet Street, Piet Retief

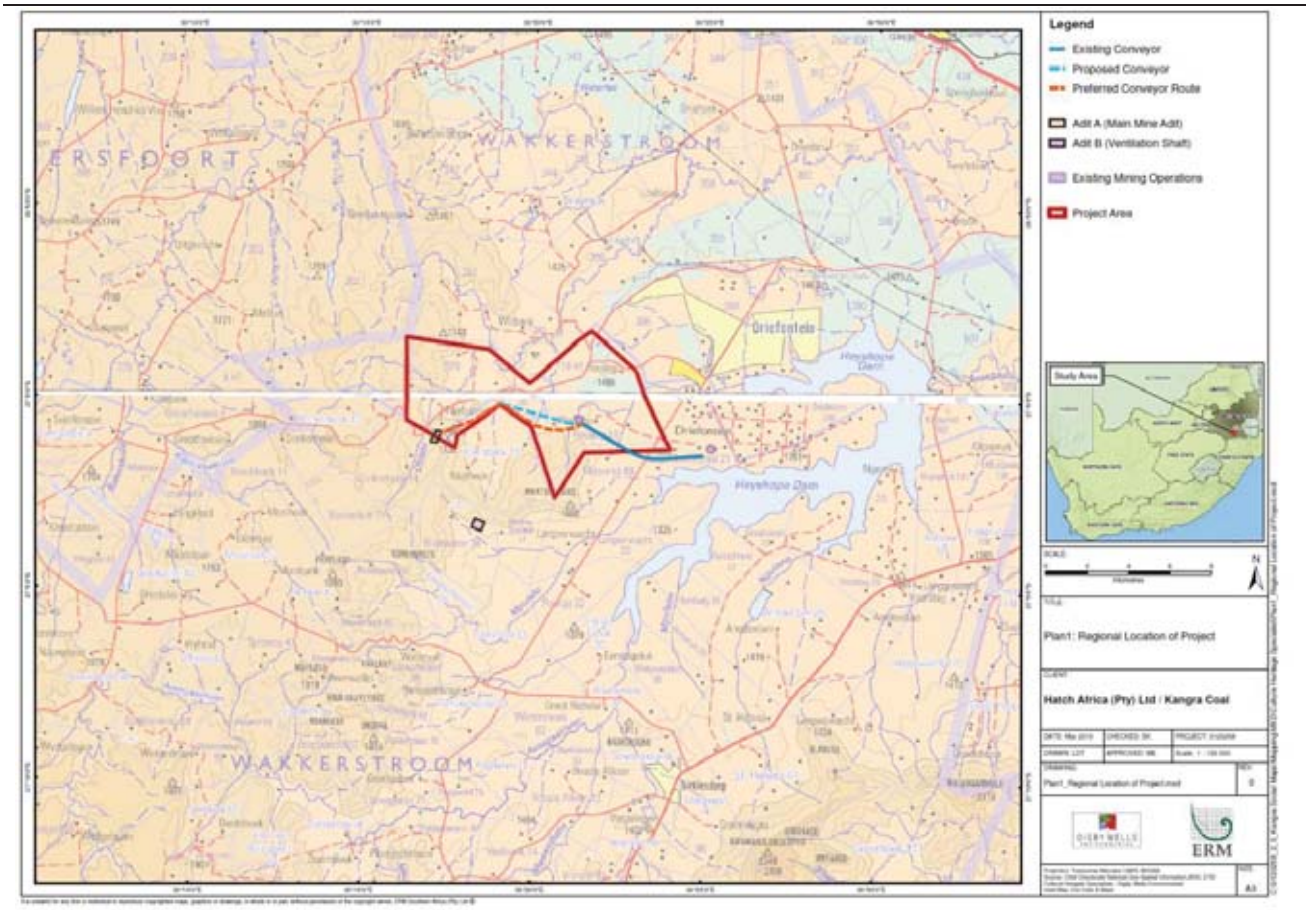
Table 1.3 Consultant Contact Details

ITEM	COMPANY CONTACT DETAILS
Company	Environmental Resources Management South Africa (Pty) Ltd
Contact person	Mr Mike Everett
Tel no	031 767 2080
Fax no	031 764 3643
E-mail address	Mike.everett@erm.com
Postal address	Unit 6, St Heliers Office Park, Corner St Helier Road and Forbes Drive, Gillitts, KwaZulu-Natal, 3610

Table 1.4 Directly Affected Landowner Contact Details

FARM	CONTACT	CONTACT NUMBER
Twyfelhoek 379 IT Portion 3	Yende Community	072 155 0434
Twyfelhoek 379 IT Portion 2		
Twyfelhoek 379 IT RE	Thuthukani	076 997 4895
Nooitgezien 381 IT RE	Kangra Coal	011 684 0149
Rooikop 18 HT Portion 1		
Rooikop 18 HT RE		
Donkerhoek 14 HT Portion 4	C. G. F. Greyling	017 730 0375/082 773 2310
Donkerhoek 14 HT Portion 22		
Kransbank 15 HT	Kanluka Community	072 554 9897
Kransbank 15 HT RE		

Figure 1.2 *Regional Setting of the Project Area 1:250 000*



2 LEGAL FRAMEWORK AND GOOD PRACTICE STANDARDS

This section will discuss the national legislation and standards and international guidelines that are relevant to the this Study. These include the MPRDA, the NEMA, and the NHRA. Each of these legislations is discussed separately below.

2.1 DEVELOPMENT CONTEXT OF STUDY AREA

The Study Area refers to the cultural landscape in an approximately 100 km radius of the siteb of the proposed Project within the borders of South Africa.

The proposed Project is located in the Gert Sibande District Municipality and the Mkhondo and Dr. Pixley Kalsaka Seme Local Municipalities. The 2012 Gert Sibande District Municipality Integrated Development Plan (GS-IDP) was reviewed to gain a more detailed understanding of the development context within which the proposed Project site is situated (Gert Sibande District Municipality IDP, 2012). The GS-IDP represented a five-year plan to guide socio-economic development within the district municipality. The proposed socio-economic development of the municipality was considered in order to better identify and assess cumulative environmental impacts on heritage resources in the Study Area.

Cumulative impacts on heritage resources were addressed and are presented in *Section* 6 of this report.

Overall, the mining sector was identified as a key sector for facilitating economic growth and promoting job creation. The mining sector primarily involves infrastructure development, social development, municipal financial viability, economic development and institutional development.

The Mpumalanga Growth and Development Path (MGDP) – included in the GS-IDP - promotes local economic growth through the following sectors (Gert Sibande District Municipality IDP, 2012):

1. Agriculture and forestry;
2. Mining and energy; and
3. Tourism and cultural interests.

Each identified sector above comprises specific types or categories of development that may impact on heritage resources in various manners. The development context in Study Area must therefore be taken into account. The identified sectors are briefly discussed below.

Agriculture and Forestry

According to the GS-IDP, growth within the agriculture sector will include a massive drive on infrastructure development that may include, among other things:

- Dams;
- Irrigation;
- Farm roads;
- Silos;
- Pack houses;
- Mechanisation;
- Electricity; and
- Infrastructure for agro-processing.

Mining and Energy

The key areas that were identified within the mining sector to facilitate economic growth included:

- The upgrading and maintenance of the coal haulage network;
- The expansion of the water network and increased reliance on water transfer schemes;
- The increase of South Africa's energy load and the improvement of alternative energy supply;
- The establishment of a mining supplier park to enhance enterprise development in the province;
- The resolution of land claims to release land for development; and
- The provision of comprehensive support to small-scale mining enterprises.

Tourism and Culture

The GS-IDP also identified key areas to facilitate growth in the tourism and cultural industries. These included broadening and diversifying primarily nature-based tourism product offerings in Mpumalanga into more mainstream market segments such as sports event, business/conference meetings, and theme or amusement parks.

2.2 NATIONAL REGULATORY FRAMEWORK

2.2.1 Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

Summary of Act

The Constitution of the Republic of South Africa (the Constitution) enshrines the basic, fundamental and inalienable rights of the citizens of the Republic.

Applicability to Project

The Constitution stipulates under Section 24 that everyone has a right to an environment that is not harmful to their health or well-being. This right extends to protecting the environment for the benefit of present an future generations through legislative and other measures that are aimed at preventing pollution and ecological degradation, promoting conservation and secure ecologically sustainable development and use of natural resources. Sustainable development and use of natural (1) resources must promote justifiable economic and social development.

2.2.2 *Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)*

Summary of Act

The Mineral and Petroleum Resources Development Act (MPRDA) makes provision for equitable access to, and sustainable development of, the nation's mineral and petroleum resources.

Applicability to Project

The MPRDA stipulates under Section 5(4) no person may prospect for or remove, mine, conduct technical co-operation operations, reconnaissance operations, explore for and produce any mineral or petroleum or commence with any work incidental thereto on any area without (a) an approved environmental management programme or approved environmental management plan, as the case may be.

2.2.3 *National Environmental Management Act, 1998 (Act No. 107 of 1998)*

Summary of the Act

The National Environmental Management Act (NEMA) creates the legal framework that ensures the environmental rights guaranteed in Section 24 of the Constitution are abided by.

Applicability to Project

The NEMA stipulates under Section 2(4)(a) that sustainable development requires the consideration of all relevant factors including (iii) the disturbance of landscapes and sites that constitute the nation's cultural heritage must be avoided, or where it cannot be altogether avoided, is minimised and remedied. Heritage assessments are implemented in terms of the NEMA Section 24 in order to give effect to the general objectives. Procedures

(1) The use and procurement of natural resources could potentially result in impacts on heritage resources that may exisit in the imediate vicinity

considering heritage resource management in terms of the NEMA are summarised under Section 24(4) as amended in 2008.

2.2.4 National Heritage Resources Act, 1999 (Act No. 25 of 1999)

Summary of the Act

The National Heritage Resources Act (NHRA) aims to introduce an integrated system for the management of South Africa's heritage resources. Further, the Act empowers civil society to nurture and conserve their heritage resources so that they can be passed onto future generations. The Act provides a framework for the management of heritage resources in South Africa and to protect heritage resources of national significance. In order to meet these objectives, the Act introduces an integrated system that can allow for the identification, assessment and management of heritage resources in South Africa.

Applicability to Project

The proposed activities associated with the proposed Project will include the extension and operation of an underground mine. This may result in the destruction or alteration of existing structures that may be older than 60 years.

Section 34 – Structures Older than 60 years

Section 34 of the NHRA provides for general protection of structures older than 60 years. Most importantly, Section 34(1) clearly states that no structure or part thereof may be altered or demolished without a permit issued by the relevant Provincial Resources Heritage Authority (PHRA). These permits will not be granted without a HIA being completed. A destruction permit will thus be required before any removal and/or demolition may take place, unless exempted by the PHRA according to Section 34(2) of the NHRA.

Section 35 – Archaeological and Palaeontological Resources and Meteorites

Section 35 of the NHRA provides for the general protection of archaeological and palaeontological resources, and meteorites. In the event that archaeological resources are discovered during the course of the proposed Project, Section 38(3) specifically requires that the discovery must immediately be reported to the PHRA, or local authority or museum who must notify the PHRA. Furthermore, no person may without permits issued by the SAHRA destroy, excavate, or make any alterations to archaeological or palaeontological resources encapsulated in Section 38(4).

With regards to the definition of palaeontological resources, Section 2 (xxxi) of the Act states that "'palaeontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil

fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance".

Construction and operation activities associated with the proposed Project – in the immediate receiving environment – are likely to impact on archaeological resources.

Section 36 – Burial Grounds and Graves

Section 36 of the NHRA allows for the general protection of burial grounds and graves. Should burial grounds or graves be found during the course of development, Section 36(6) stipulates that such activities must immediately cease and the discovery reported to the responsible heritage resources authority and the South African Police Service (SAPS). Furthermore, as specified in Section 38(3) no person may destroy, damage, exhume or alter any burial site without a permit issued by SAHRA.

Construction and operation activities associated with the proposed Project – in the immediate receiving environment – are likely to impact on burial grounds and graves.

Section 37 – Public Monuments and Memorials

Section 37 makes provision for the protection of all public monuments and memorials in the same manner as places which are entered in a heritage register referred to in Section 30 of the NHRA.

Construction and operation activities associated with the proposed Project – in the immediate receiving environment – are likely to impact on public monuments and memorials should they exist in the Project Area.

Section 38 – Heritage Resources Management

The provisions of this section do not apply to a development as described in Section 38 (1) if an evaluation of the impact of such development on heritage resources is required in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environment Affairs and Tourism, or the Minerals Act, 1991 (Act No. 50 of 1991), or any other legislation. Section 38(8) ensures cooperative governance between all responsible authorities through ensuring that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of Subsection (3), and any comments and recommendations of the relevant heritage resources authority with regard to such development have been taken into account prior to the granting of the consent.

The Listed Activities in terms of the Government Notice Regulations (GNRs) stipulated under NEMA (for which Environmental Authorisation (EA) will be required) will trigger the requirement for an HIA as contemplated in Section 38(1) above as follows:

Table 2.1 Listed Activities in Terms of the GNRs Stipulated Under NEMA

NEMA Listed Activity	NHRA Section 38 Trigger	Definition
Linear Development		
GN. R. 544-22 GN. R. 544-47 GN. R. 546-4	38(1)(a)	• Construction of a road or any linear development longer than 300 m; and • Construction of a bridge or similar structure longer than 50 m.
Non-linear Development		
GN. R. 544-13 GN. R. 544-23	38(1)(c)(i)	• Transformation of land in excess of 5 000 m² that will change the character of a site.
GN. R. 544-24 GN. R. 545-15	38(1)(c)(ii)	• Transformation of land involving three or more existing erven or divisions.
GN. R. 546-13 GN. R. 546-14	38(1)(d)	• Rezoning of land in terms of other legislation (i.e.: NEMA, etc.).
Other Triggers		
GN. R. 544-20 GN. R. 545-20	38(1)(e)	• Other triggers, e.g.: in terms of other legislation, (i.e.: NEMA, etc.).

2.3 NATIONAL GUIDELINES AND STANDARDS

2.3.1 South African Heritage Resources Agency Minimum Standards

The South African Heritage Resources Agencey (SAHRA) Minimum Standards makes provision for the compilation and integration of Archaeological Impact Assessments (AIAs) and Palaeontological Impact Assessments (PIAs) as specialist components of the broader HIA and Environmental Impact Assessments (EIAs) (SAHRA, 2006). The process of assessment for these specialist reports usually involves a Scoping Report, a Phase 1 Heritage Impact Assessment Report, a Letter of Recommendation for Exemption or Phase 2 Mitigation/Rescue, and a Phase 3 Heritage Site Management Plan.

The Phase 1 Heritage Impact Assessments, as stipulated by the SAHRA Minimum Standards, comprise of Phase 1 AIAs and/or Phase 1 PIAs. These assessments usually involve a field survey of the proposed Project and will include:

- Details of property to be developed and the type of assessment (Section 38(1) or Section 38(8);
- Location of the sites that are found;
- Short description of the characteristics of each site;

- Short assessment of the importance of each site, indicating which should be conserved and which mitigated;
- Assessment of the potential impact of the development on the site/s;
- In some cases, a shovel test, to establish the extent of the site, or collection of material might be required to identify the associations of the site (a pre-arranged permit is required); and
- Recommendations for conservation or mitigation.

When the Phase 1 report forms part of an EIA, public consultation and spatial and visual impacts of the development must be undertaken as part of the general study. If the Phase 1 forms a major component of an HIA, it will be necessary to ensure that the study complies with Section 38 of the NHRA. Phase 1 specialist reports will be assessed by the Mpumalanga Heritage Resources Authority (MPHRA). If the decision is that the sites are of low significance, they may, after recording, be destroyed to make way for development. The final decision about this should be taken by the HRA, which should give formal permission for the destruction.

In the case of AIAs and PIAs that form part of EIAs and Environmental Management Plans (EMPs), the HRA will issue comment or a Record of Decision (RoD) that may be forwarded to the consultant or developer, relevant government department or heritage practitioner and where feasible to all three.

Where a property is either very disturbed or is very small and the archaeologist can see that it is highly unlikely that any archaeological remains will be found, a Letter of Recommendation for Exemption from a full Phase 1 HIA report may be supplied. This must be accompanied by a map and photograph indicating landscape features.

2.3.2 International Council on Monuments and Sites

The credibility of the information sources is vital in determining the importance and authenticity of heritage resources. The International Council on Monuments and Sites (ICOMOS) Nara Document on Authenticity (Nara Document on Authenticity, 1994) forms the basis of determining authenticity. Based on this document, it is accepted that understanding and determining the value attributed to heritage resources rely on certain information sources. These sources need to be assessed as credible or truthful, which requires knowledge and understanding of such information sources in relation to original and subsequent characteristics of the cultural heritage and their meaning.

The ICOMOS Charter for Places of Cultural Significance, 1999 (the Burra Charter) provides guidance for the conservation and management of places of cultural significance. ICOMOS Charters are generally published following proceedings held in and hosted by various ICOMOS member states. The Burra Charter: ICOMOS Charter for Places of Cultural Significance is thus a Charter that was adopted by ICOMOS following the 1979 ICOMOS meeting in Burra,

South Australia. The Burra Charter considered the 1964 Venice Charter: International Charter of the Conservation and Restoration of Monuments and Sites and the 1978 Moscow Resolutions of the 15th General Assembly of ICOMOS. The Burra Charter also formed the foundation for much of the South Africa NHRA. It defines and describes various heritage issues in more detail that are at times only alluded to in the NHRA.

According to this Charter, the cultural significance of a heritage resource (defined as a site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views) and other issues affecting its future are best understood by a sequence of collecting and analysing information before making decisions. Understanding cultural significance comes first, then development of policy and finally management of the heritage resource in accordance with the policy. The policy for managing a heritage resource must therefore be based on an understanding of its cultural significance. Policy development should also include consideration of other factors affecting the future of a heritage resource such as the owner's needs, resources, external constraints and its physical condition (The Burra Charter, 1999).

2.4 KANGRA COAL POLICIES

Kangra Coal is committed to responsible environmental stewardship and sustainable business practices; Kangra Coal pledges to improve their overall environmental performance across all their business activities. Kangra Coal encourages their business partners and members of the entire Kangra group to participate in this endeavour.

In accordance with this Environmental Policy (ENV-P-001), strives for compliance with all environmental laws and commits to manage all of its activities in the environment. With regards to heritage and the environment, Kangra Coal pledges to:

- Adopt the highest environmental standards in all areas of operations meeting and exceeding all relevant legislative requiremets to which Kangra suscribes to;

- Regularly evaluating the existing and potential impact of its operations (including those relating to work undertaken by all staff) on the environment; and

- Continuosly conduct research to increase the knowledge on the environmental effects of Kangra Coal's relative activities and development or adoption of approprite processes, technologies and equipment to meet anticipated environmental needs.

3 IMPACT ASSESSMENT METHODOLOGY

The Impact Assessment methodology comprises a number of steps that collectively assess the manner in which the proposed Kusipongo Resource Expansion Project will interact with elements of the heritage resources to produce impacts to resources/receptors. The steps involved in the impact assessment stage are described in greater detail below.

3.1 HERITAGE RESOURCES MANAGEMENT (HRM)

Digby Wells has developed a HRM process aimed at expediting decisions by relevant Heritage Resources Authorities (HRAs). This process is firmly founded on the NHRA. This process is a phased approach aimed at integrating HRM with the MPRDA and NEMA processes.

Heritage resources – both cultural and natural – are finite, non-renewable and irreplaceable. They characterise community identity and cultures and are therefore intrinsic to the history and beliefs of communities. As sources of information, heritage resources have inherent potential to contribute significantly to research, education and tourism as well as allowing capacity for reconciliation, understanding and mutual respect.

Considering the innate value of heritage resources, the foundation of HRM is the acknowledgement that heritage resources have lasting worth as evidence of the origins of life, humanity and society. Every generation is therefore morally obligated to act as trustees of heritage for future generations through conservation, preservation and protection.

Accordingly, HRM must take into account rights of affected communities to be consulted and to participate. Where heritage resources are developed and presented, the dignity and respect of diverse cultural values must be ensured. In addition, heritage in its broadest sense must never be used for sectarian purpose or political gain.

3.2 IMPACT ASSESSMENT METHODOLOGY

The impact assessment stage includes several steps aimed to evaluate the way in which environmental aspects will or may interact with the cultural landscape resulting in environmental impacts on heritage resources See *Appendix B* for the Impact Assessment Methodology created by Digby Wells. Environmental aspects and impact are defined as:

- ***Environmental Aspects*** – an element of an organisation's activities, products, or services that can interact with the environment; and

- ***Environmental Impacts*** – any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's environmental aspects.

However, in terms of cultural heritage resources, environmental impacts should be assessed relative to the heritage value or significance of a resource. The methodology employed in the various stages of the impact assessment process is described in more detail in the sections below [(1)].

3.3 *STATEMENT OF SIGNIFICANCE OR VALUE*

Notwithstanding the fundamental value ascribed to heritage, the significance of individual heritage resources needs to be determined to allow implementation of appropriate management measures. This is achieved through assessing a heritage resource's value relative to certain prescribed criteria, encapsulated in the NHRA as well as in several international conventions. The significance of a heritage resource thus determines the magnitude of change that may result from environmental impacts. As a result, environmental impacts that are rated as low may cause severe change in a heritage resources rated as highly significant. Conversely, severe impacts may cause negligible change to an insignificant resource. Value is determined by assessing the authenticity and integrity of a heritage resource by applying the formula provided in *Table 3.1*. Value thresholds are provided in *Table 3.2*.

Table 3.1 Formula for Calculating Heritage Resource Value

Multiplied By		**Authenticity**					
		0	3	6	9	12	15
Integrity	0	0	0	0	0	0	0
	1	0	3	6	9	12	15
	2	0	6	12	18	24	30
	3	0	9	18	27	36	45
Value = authenticity + integrity where Authenticity = importance (average sum of attributes per dimension) + credibility							

Table 3.2 Value Thresholds

Score	**Description**	**Rating**
0	Resource of no/negligible heritage value as part of national estate	None/negligible
1-15	Resource of low heritage value: change to resource not significant	Low
16-30	Resource of medium heritage value: project mitigation must aim to reduce any impacts on	Medium

[(1)] This Impact Assessment Methodology, excluding the sections on Impact Significances, Residual Impacts and Cumulative Impacts which were produced by ERM (Pty) Ltd, has been produced by Digby Wells Environmental and can be found in its entirety in Appendix B.

	resource; conservation may be required.	
31-45	Resource of exceptional value and must be considered for inclusion in national estate: project mitigation must attempt to remove all impacts; consideration must be given to conservation/preservation of resource.	High

The steps involved in determining the value of a heritage resource are described in more detail below.

3.3.1 Authenticity

As is mentioned above, the Nara Document on Authenticity (Nara Document on Authenticity, 1994) forms the basis of determining authenticity. Based on this document, it is accepted that understanding and determining importance attributed to heritage resources rely on credible information sources [(1)]. These sources need to be assessed as credible or truthful. This requires knowledge and understanding of information sources employed in relation to original and subsequent characteristics of heritage resources, and their meaning.

Authenticity is therefore determined in terms of the importance of a resource considering available sources of information. Thresholds for authenticity are provided in *Table 3.3*.

Table 3.3 Authenticity Thresholds

Score	Description	Rating
0	None	None/negligible
1-5	Negligible to low level of authenticity evident.	Low
6-10	Authenticity merely evident: importance illustrated in credible information sources.	Medium
11-15	Authenticity of resource undisputed.	High

Importance

The importance of a heritage resource is determined on four dimensions – aesthetic, historic, scientific, and social. In turn, each dimension is measured

[(1)] **Information sources** are defined as all physical, written, oral, and figurative sources, which make it possible to know the nature, specifications, meaning, and history of the cultural heritage. Therefore, determining authenticity of a resource requires a sound knowledge of the type of heritage resource as well as the context within which it occurs – the cultural landscape. This knowledge must be gained through a detailed baseline that must aim to contextualise the resources. Information that should be considered are published, peer reviewed literature, archival research, popular publications, and any other information source that may be relevant (Nara Document on Authenticity, 1994).

against one or more descriptive attributes, defined in national legislation and in international convention: NHRA, ICOMOS Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, and the Burra Charter. These attributes, or criteria, are aimed to provide a guide as to whether a resource should be included in the National Estate as defined in these documents and presented in *Table 3.4*.

Table 3.4 Summary of Dimensions and Attributes

Dimension	Attributes considered		NHRA Ref.
Aesthetic and technical Historical importance and associations	1	Importance in aesthetic characteristics	S.3(3)(e)
	2	Degree of technical / creative skill at a particular period	S.3(3)(f)
	3	Importance to community or pattern in country's history	S.3(3)(a)
	4	Site of significance relating to history of slavery	S.3(3)(i)
	5	Association with life or work of a person, group or organisation of importance in the history of the country	S.3(3)(h)
Information potential	6	Possession of uncommon, rare or endangered natural or cultural heritage aspects	S.3(3)(b)
	7	Information potential	S.3(3)(c)
	8	Importance in demonstrating principle characteristics	S.3(3)(d)
Social	9	Association to community or cultural group for social, cultural or spiritual reasons	S.3(3)(g)

Importance ratings need to be provided for each applicable attribute per dimension. Each dimension's ratings are averaged and rounded off to allow for a consistent rating irrespective of whether one or more attributes are considered. Definitions and ratings are provided in *Table 3.5*.

Table 3.5 Importance Definitions

Importance	Definition
0	None
1	Attributes considered commonplace, well or over represented; Importance generally not considered by any community
2	Attributes considered uncommon, underrepresented; Importance generally considered by some communities.
3	Attributes considered singular, unique, irreplaceable; Importance always considered by most communities.

Credibility

Credibility of information sources forms the basis in determining the importance of heritage resources. The importance rating per dimension and attribute discussed above is thus intrinsically linked to the credibility of information sources used. Credibility thresholds and definitions are provided in *Table 3.6*.

Table 3.6 Credibility Definitions

Credibility	Definition
0	Credibility of information cannot be determined: Conjecture, unverified personal opinions; biases evident.

1	Secondary and tertiary information sources such as popular media, newspapers, magazines; 'Information' websites e.g. Wikipedia, etc., and individual opinions.
2	Credible secondary sources such as factually correct textbooks and popular publications, official websites, and verifiable oral accounts.
3	Highly credible information sources such as peer reviewed publications, primary sources, and verified oral accounts.

3.3.2 Integrity

Integrity is determined by examined the physical condition of a heritage resource – as witnessed at the time of the assessment – compared to an ideal or other existing example. Integrity ought to be assessed only after the resource's authenticity has been determined, as the information source/s used should provide comparative examples against which its present condition may be measured. Thresholds and definitions for integrity are described in *Table 3.7*.

Table 3.7 Integrity Definitions

Integrity	Definition
0	Resource degraded to extent where no information potential exists; resource cannot be restored; single, isolated find, without any site context.
1	Poor condition, active decay visible; excessive restoration required; little information potential.
2	Fair to good condition; well preserved; some decay present; can be easily restored/conserved/preserved; good information potential.
3	Excellent/pristine; extremely well preserved; little to no decay present; little restoration required/restoration will greatly enhance resource; excellent information potential.

3.4 IMPACT ASSESSMENT

Assessing impacts on heritage resources is based first on the value of a resource and second, on how that value may change due to impacts. The impact assessment stage comprises a number of steps that collectively assess the manner in which the Project will interact with elements of the physical, biological, cultural or human environment to produce impacts to heritage resources. The steps involved in the impact assessment stage are described in greater detail the section below.

Environmental management systems employ relative standard terminology that characterises impacts. This terminology has been adapted to provide a well-defined descriptive terminology for use in assessing environmental impacts on heritage resources summarised in *Table 3.8* below.

Table 3.8 Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	Relationship of an assumed impact to a heritage resource (in terms of cause and effect).	Direct Indirect Induced
Scale of Change	The physical area (size) of a heritage resource that may change.	None Isolated parts/aspects will change Large parts/aspects will change Most or entire resource will change
Duration	The time period over which a resource will change.	Immediate, non-permanent and fully reversible Long-term, non-permanent and reversible Long-term, permanent and irreversible Immediate, permanent and irreversible
Intensity	How an impact could change the authenticity and integrity, thus importance, of a resource.	None Change in integrity without affecting authenticity Change in integrity will affect aspects of authenticity Change in integrity will affect overall authenticity
Probability	Likelihood of change occurring.	None Project-related mitigation will remove change Project-related mitigation will reduce change Project-related mitigation will not reduce change

The significance of change to heritage resources due to environmental impacts is determined as follows:

Impact significance = Value X Magnitude

Where

Magnitude = Consequence X Probability

And

Consequence = Spatial Scale + Duration + Intensity

The impact rating is applied to pre- and post-mitigation scenarios. The ideal is to remove all impacts to a heritage resource. Where post-mitigation significance is not zero, the recommended field rating (heritage) mitigation must be undertaken. The tables

Table 3.9 to *Table 3.12* below provides the various descriptions and thresholds applicable to the impact assessment ratings.

Table 3.9 Scale Thresholds, Definitions and Designation

Score	Description	Rating
0	No change	None
1	Isolated parts/aspects of heritage resource will be affected	Low
2	Large parts/aspects of heritage resource will be affected	Medium
3	Most or entire heritage resource will be affected	High

Table 3.10 Duration Thresholds, Definitions and Designation

Score	Description	Rating
0	Change will be immediate, non-permanent and fully reversible	None
1	Change will occur over the long-term, result will be non-permanent and reversible	Low
2	Change will occur over the long term and the result will be permanent and irreversible	Medium
3	Change will be immediate, permanent and irreversible	High

Table 3.11 Intensity Thresholds, Definitions and Designations

Score	Description	Rating
0	No change to integrity and authenticity	None
1	Change to integrity that will not cause any change in authenticity (importance)	Low
2	Change to integrity that will cause change to certain authentic aspects (importance) (describe and define aspects)	Medium
3	Change to integrity that will cause change to overall authenticity (importance)	High

Table 3.12 Probability Thresholds, Definitions and Designations

Score	Description	Rating
0	No change	None
1	Project-related mitigation measures will avoid change	Unlikely
2	Project-related mitigation measures will reduce change	Probable
3	Project-related mitigation measures will not avoid change	Certain

Once the impact characteristics are understood, these characteristics are used to assign each impact a *magnitude*. In summary, magnitude is a function of the following impact characteristics:

- Scale;
- Duration;
- Intensity; and
- Probability.

Magnitude essentially describes the degree of change that the impact is likely to impart upon the heritage resource. The magnitude of impacts takes into account all the various dimensions of a particular impact in order to make a determination as to where the impact falls on the spectrum (in the case of adverse impacts) from *no change* to *high*. Some impacts will result in changes

to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes can be regarded as essentially having no impact, and should be characterised as having a *no change* magnitude. In the case of *positive* impacts no magnitude will be assigned. The thresholds designations and definitions for magnitude are described in *Table 3.13* overleaf.

Table 3.13 Magnitude of Change Thresholds, Designations and Definitions in Relation to Three Categories of Heritage Resources

Threshold	Magnitude	Archaeology, Palaeontology	Built Environment/Structures	Historic Landscape
0	**No change**	No change	No change to fabric or setting	No changes to landscape elements, parcels or components; no visual or audible changes; no changes in amenity or community factors.
1-49	**Low**	Very minor changes to key archaeological materials, or setting.	Slight changes to historic building elements or setting that hardly affect it.	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise or sound quality; very slight changes to use or access; resulting in very small change to historic landscape character.
50-98	**Medium**	Changes to key archaeological materials, such that the resource is slightly altered; slight changes to the setting.	Change to key historic building elements, such that the resource is slightly different; change to setting of an historic building, such that it is noticeably changed.	Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of the historic landscape; limited changes in noise or sound quality; slight changes to use or access; resulting in limited changes to historic landscape character.
99-147	**High**	Changes to many key archaeological materials, such that the resource is clearly modified; changes to the setting that affect the character of the asset	Change to many key historic building elements, such that the resource is significantly modified; change to setting of an historic building, such that it is significantly modified.	Change to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
		Changes to attributes that convey outstanding national value of national estate; Most or all key archaeological materials, including those that contribute to ONV such that the resource is totally altered; comprehensive changes to setting	Change to key historic buildings that contribute to outstanding national value of national estate such that the resource is totally altered; Comprehensive changes to setting.	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit and loss on outstanding national value.

After characterising the magnitude of impact, the next principal step [1] necessary to assign significance for a given impact is to define the sensitivity of the impacted heritage resource. There are a range of factors to be taken into account when defining the sensitivity of the heritage resource and these are discussed in *Section 3.3* above.

The sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a heritage resource basis. The sensitivity designations are:

- Low;
- Medium; and
- High.

Once magnitude of impact and sensitivity of heritage resource have been characterised, the significance can be assigned for each impact.

Table 3.14 Impact Significances

		Value of Heritage Resource			
		None/negligible	**Low**	**Medium**	**High**
Magnitude of Impact	**No change**	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Minor	Moderate	Moderate
	Medium	Minor	Moderate	Major	Major
	High	Moderate	Major	Major	Major

The matrix applies to heritage resources and all impacts to heritage resources, as the resource- or impact-specific considerations are factored into the assignment of magnitude and sensitivity designations that enter into the matrix. *Box 3.1* provides a context for what the various impact significance ratings signify.

[1] This step of the Impact Assessment Methodology that is presented here in this HIA report has been developed by ERM (Pty) Ltd.

Box 3.1 Context of Impact Significances

An impact of ***negligible*** significance is one where a heritage resource will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of ***minor*** significance is one where a heritage resource will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the heritage resource is of low importance. In either case, the magnitude should be well within applicable standards.

An impact of ***moderate*** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of ***major*** significance is caused by an activity that in effect is breaking the law and/or is not best practice. This means that impacts of major significance have to be reduced to moderate or minor impacts and that the impacts have to be managed effectively and efficiently.

3.5 FIELD RATING

Field ratings, or proposed grading of heritage resources, are required by SAHRA in terms of Section 7(1) of the NHRA. Field ratings are based on the assessments of heritage resources in relation to criteria contained in Section 3(3) of the NHRA (see *Section 3.4* above). Section 7 further outlines a three-tier system for heritage resources management of the National Estate based on proposed grading:

- National: SAHRA is responsible for identification and managing of Grade I heritage resources;
- Provincial: PHRAs are responsible for identification and managing of Grade II heritage resources; and
- Local: Local authorities (local and district municipalities, metros, local government) are responsible for identification and managing of Grade III heritage resources.

Field ratings are based on (equal to) the value of heritage resources. The thresholds for field ratings are presented in *Table 3.15*.

Table 3.15 Field Rating Thresholds and Descriptions

NHRA Section 7 Grading			
Score	**Grade**	**Protection**	**Recommended Heritage Mitigation**
41-45	Grade I	National	Heritage resource should be nominated as a National Site/Object, included in National Estate
36-40	Grade II	Provincial	Heritage resource should be nominated as a Provincial Site/Object, included in National Estate
31-35	Grade III A	Local	Heritage resource should be nominated as a Regional Site/Object, included in National Estate
16-30	Grade III B	Local	The heritage resource must be mitigated and partly conserved/preserved
8-15	Grade IV A	General	The heritage resource must be mitigated before destruction
1-7	Grade IV B	General	The heritage resource must me recorded before destruction
0	Grade IV C	General	No mitigation required – heritage resource has been sufficiently recorded

3.6 MITIGATION OF IMPACTS

Once the significance of a given impact has been characterised using the HRM matrix, the next step is to evaluate what mitigation measures are warranted. In keeping with the Mitigation Hierarchy, the priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the heritage resource via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude). Mitigation measures can therefore fall in two categories: project-related mitigation and mitigation of sites/heritage resources:

1. ***Project-Related Mitigation*** – impacts on heritage resources may be avoided or reduced through the implementation of feasible mitigation measures related to the Project design and planning. For instance, an historical building may be preserved *in situ* by changing infrastructure footprints.

2. ***Mitigation of Heritage Resources*** – where Project-related mitigation does not reduce of remove impacts on a heritage resource, the resource itself may require mitigation. For example, any resource located in the footprint of Adit A will inevitably be destroyed, irrespective of any project-related mitigation measures as the pit cannot be moved. Depending on the value of a resource (field rating/grading) certain prescribed site mitigation measures must then be implemented. This could include:

    - ***Site Preservation*** – conservation is essentially a no-development recommendation ad may be achieved through appropriate project-related mitigation;

- ***Site Mitigation*** – site conservation (no-development in the particular area) or Phase 2 mitigation (Shovel Test Pits (STPs)) after which development may legally proceed in the area; and

- ***Site Destruction*** – if a particular identified resource is of little archaeological or cultural heritage significance, a recommendation of site destruction will be made by an accredited archaeologist. A site destruction recommendation essentially implies that the site may be destroyed during the course of development without the developer having to comply with any archaeological or cultural heritage requirements.

It is important to have a solid basis for recommending mitigation measures. The role of any impact assessment is to develop a consentable Project, and to help achieve business objectives in a responsible manner. Impact assessment is about identifying the aspects of a Project that need to be managed, and demonstrating how these have been appropriately dealt with. As key influencers in the decision making process, the role of the impact assessment is not to stop development or propose every possible mitigation or compensatory measure, rather it is to make balanced judgements as to what is warranted, informed by a high quality evidence base.

Additional mitigation measures should not be declared for impacts rated as not significant, unless the associated activity is related to conformance with an 'end of pipe' applicable requirement. Further, it is important to note that it is not an absolute necessity that all impacts be mitigated to a not significant level; rather the objective is to mitigate impacts to an ALARP level.

Embedded controls (i.e., physical or procedural controls that are planned as part of the Project design and are not added in response to an impact significance assignment), are considered as part of the Project (prior to entering the impact assessment stage of the impact assessment process).

3.7 RESIDUAL IMPACT ASSESSMENT

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

3.8 CUMULATIVE IMPACTS/EFFECTS

Cumulative impacts and effects are those that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect. These are termed cumulative impacts and effects.

The impact assessment process should predict any cumulative impacts/effects to which the proposed Project may contribute. The approach for assessing

cumulative impacts and effects resulting from the proposed Project and another activity affecting the same heritage resource is based on a consideration of the approval/existence status of the 'other' activity and the nature of information available to aid in predicting the magnitude of impact from the other activity.

4 RECEIVING ENVIRONMENT

This section will describe the receiving environment of the Study and Project Areas. The Study Area was considered to include the cultural landscape in an approximately 100 km radius of the Project Area within the borders of South Africa (*Figure 4.1* and *Figure 4.2*). The Project Area is defined as the boundaries supplied by Kangra Coal for the proposed development. The Study Area allowed inferences to be made of potential sites that could exist within the Project Area based on certain sources of information such as previously completed relevant heritage studies.

The following subsections are discussed in this section:

- Heritage Baseline from Literature:
    - Previous Impact Assessment Studies
- Paleontological Context
- Historical Context:
    - Stone Age
    - Iron Age
    - Histroic Period
    - Social Histroy
- Screening Assessment

Figure 4.1 *Regional Setting of the Project Area 1:50 000*

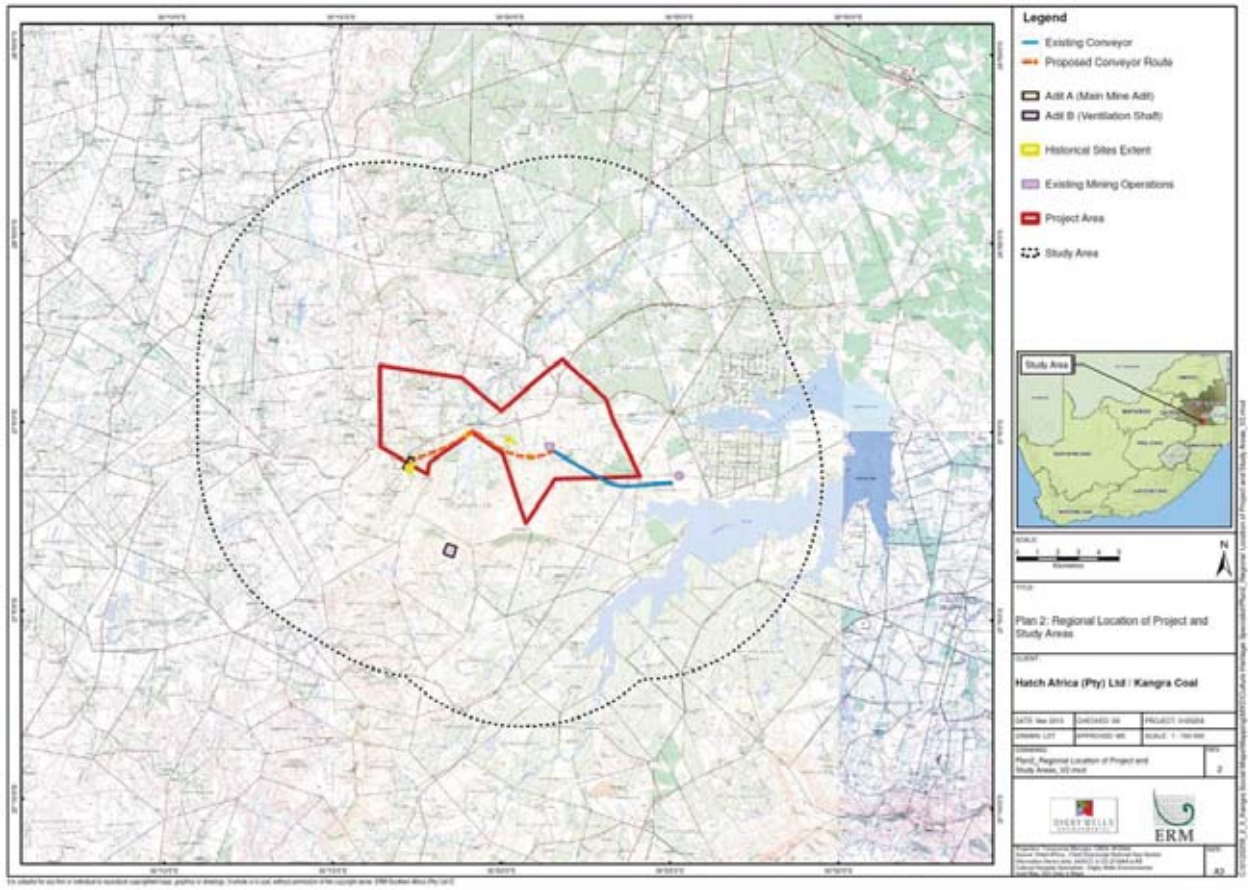
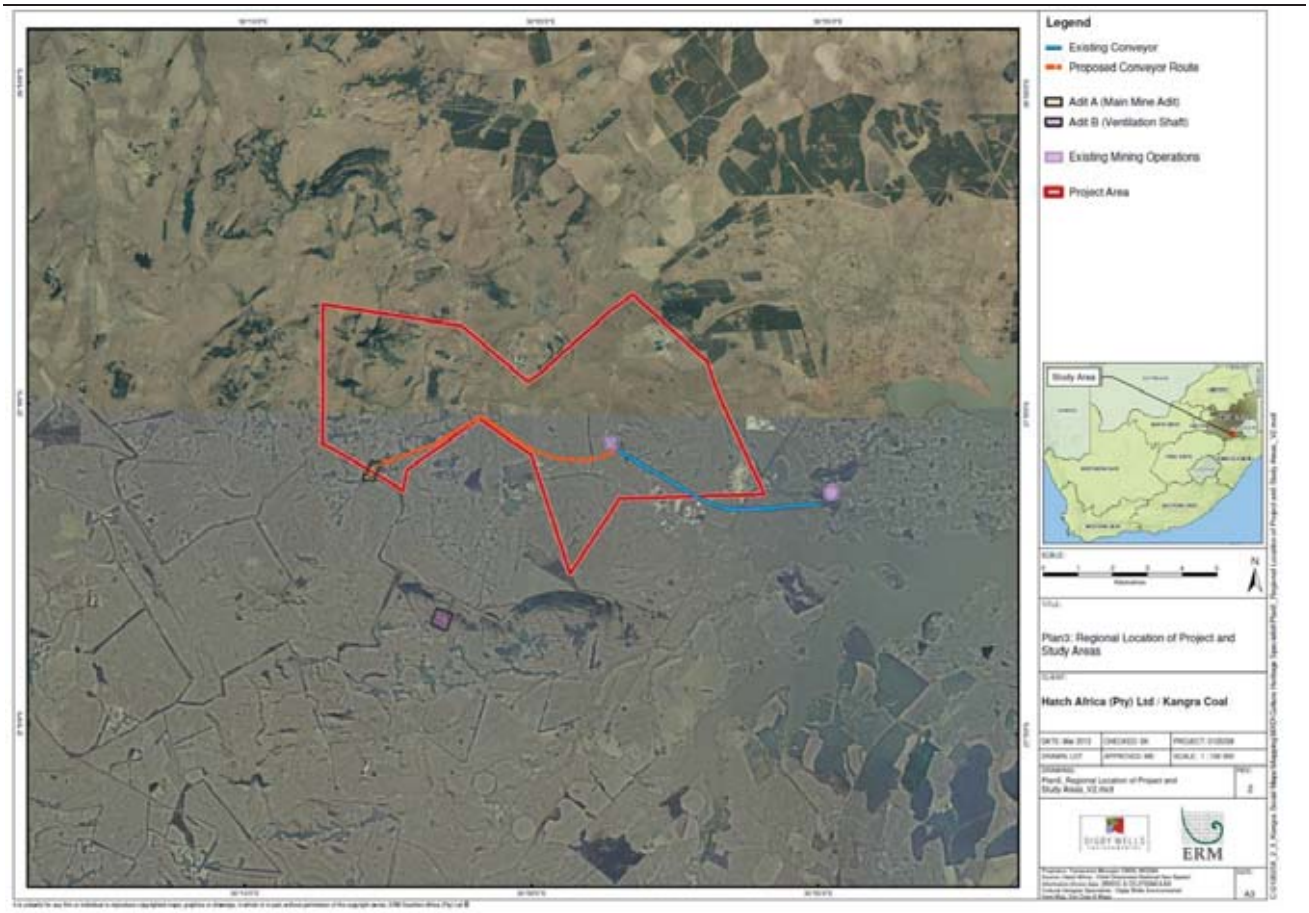


Figure 4.2 *Regional Setting of the Project Area 1:10 000*



4.1 GEOLOGICAL SETTING

The Study Area is underlain by the sedimentary rocks of the Madzaringwe Formation of the Ecca Group. hese Ecca Group rocks form part of the north-eastern margin of the Karoo basin which were filled by the sedimentary rocks of the Karoo Supergroup.

The Onverwacht Group which underlies the Ecca Group consists mostly of lava, tuff, schists and chert. During deposition of the sediments in the Karoo Basin, tension in the crust due to continuing loading lead to intrusion of Post-Karoo dolerite sills and dykes along fractures, fissures and faults. As a result, dykes and sills intruded the Project Area.

Table 4.1 ***Stratigraphy of the Project Study Area***

Phanerozoic	**Palaeozoic**	**250 million years ago (mya)**	*Madzaringwe Formation*
			Ecca Formation
			KAROO SUPERGROUP

4.2 PALAEONTOLOGICAL CONTEXT (1)

Within the Mpumalanga Province, the 300 million year old rocks of the Karoo Super Group are well preserved and extensively distributed. In the far north regions of the province, the Karoo rocks comprise a thin layer covering the bedrock but further south towards Carolina and Ermelo the Karoo rocks are thick and contain massive coal seams.

The Mpumalanga coals were formed from rotting forests in vast swamps over a 100-million years period between 200 mya and 300 mya. During this time, primitive plants such as *Glossopteris* flora (*Figure 4.3*) were found in abundance throughout the entire southern hemisphere and mammal-like reptiles and later dinosaurs roamed the entire landscape of Mpumalanga.

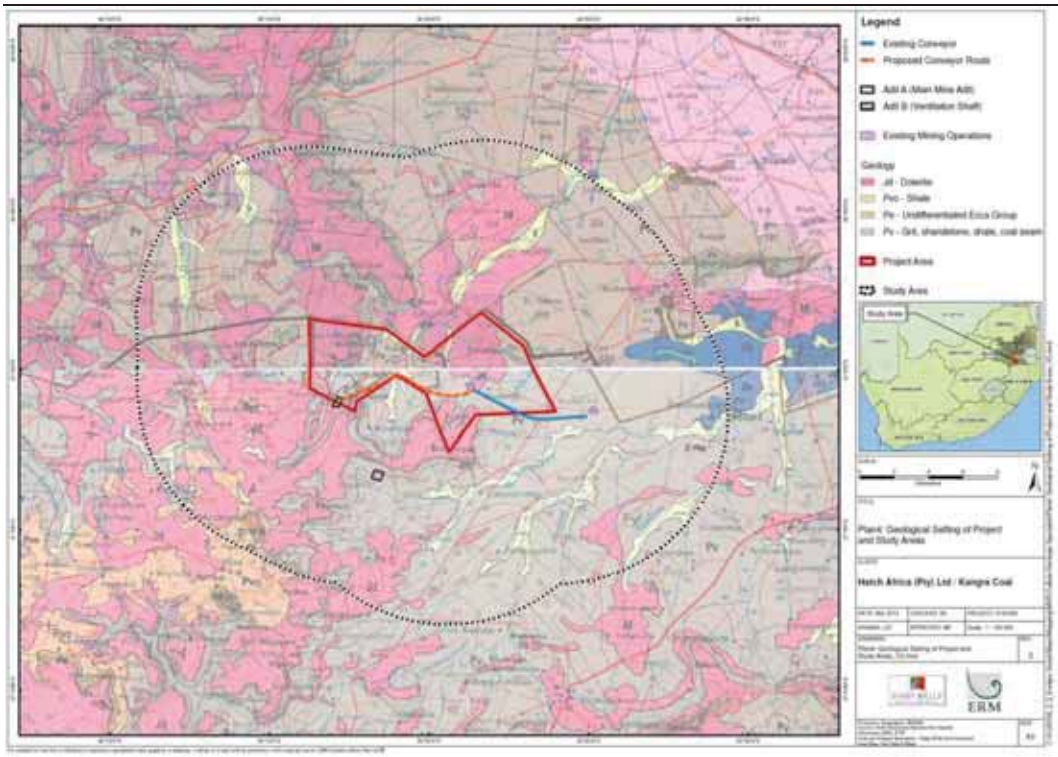
(1) ***Please Note*** – a standalone Palaeontological study was not completed; rather, the palaeontological study forms an integrated component of this HIA.

Figure 4.3 Glossopteris Leaves (Source: Maropeng Museum (Maropeng, 2013))

4.3 EXPECTED PALAEONTOLOGY

Coals are, by their nature, plant rich. Good quality coal do not preserve the anatomy of the original plant matter but the shales between the sequences do. Here it is possible to find well preserved *Glossopteris* leaves, roots and inflorenscence, lycopod and sphenophyte stems, ferns, cordaitaleans and early germnosperms. Bones of vertebrates that occurred at this time are seldom preserved with the plants. Fossil of insects, however, are often found. Fossils of plants and insecrs are found in in the shales of the Ecca Group and are commonly displayed in local and national museums.

Figure 4.4 *Geological Setting*



4.4 PRE-HISTORICAL AND HISTORICAL CONTEXT (1)

Please Note

This Section provides a historical context of the *broader* Study Area and its aim is to inform the study as to the potential heritage resources that could potentially be located in the Project Area.

4.4.1 Stone Age

South Africa has been inhabited by tool producing hominids for at least two million years. Much of the evidence for the presence of hominin activity is derived from stone tools. These tools are not only indicative of their presence in the landscape, but also attest to the technological developments of our genus. Varying factors, including geology, geomorphology, climate, fauna and flora have resulted in a complex record of social and technological changes through time.

An approach adopted by Lombard *et al.* (2012) is to acknowledge that archaeological assemblages are not exact replicas of one another even though they may overlap economically, chronologically and/or regionally as indicated in *Table 4.2*. The classification is based on *technocomplexes*, also known as industrial complexes, defined as assemblages that share a polythetic range (a context or a class of things having many but not all properties in common). Through time, changes in an industry may be expressed as phases, whereas regional variations (spread less widely than a technocomplex but found at several sites) may be expressed as distinct industries in a technocomplex where there is a high level of similarity in design, but not necessarily frequency, of artefact types (Lombard, et al., 2012).

Table 4.2 ***The South African and Lesotho Stone Age Sequence (After Lombard et al., 2012)***

Period	Technocomplex	Also Known as (Including Regional Variants)
Early Stone Age >200 ka	ESA-MSA transition >200 000-600 000 years ago (ka)	(informal designation) (Fauresmith, Sangoan)
	Acheulean 300 ka-1.5 mya	
	Oldowan 1.5-2 mya	
Middle Stone Age >20 ka - <300 ka	final MSA 20-40 ka	(informal designation) MSA IV at Klasies River, MSA 4 generally
	Sibudu 45-58 ka	late MSA / post-Howieson's Poort or MSA III at Klasies and MSA 3 generally (all informal designations)
	Howieson's Poort 58-66 ka	
	Still Bay 70-77 ka	

(1) ***Please Note*** – this Section is based on a review of literature and describes the heritage setting of the area surrounding the Project Area, namely the Study Area. The prupose of this section is to provide background as to what type of heritage resources have been identified in the Study Area and thus an overview of what resources may occur on Project Site.

Period	Technocomplex	Also Known as (Including Regional Variants)
	pre-Still Bay 72-96 ka	(informal designation)
	Mossel Bay 77-105 ka	MSA II at Klasies River, MSA 2b generally (Pietersburg, Orangian)
	Klasies River 105-130 ka	MSA I at Klasies River, MSA 2a generally (Pietersburg)
	early MSA 130-300 ka	(informal designation)
Later Stone Age <40 ka	ceramic final LSA <2 ka	Ceramic post-classic Wilton, Late Holocene with pottery (Doornfontein, Swartkop)
	final LSA 0.1-4 ka	Post-classic Wilton, Holocene microlithic (Smithfield, Kabeljous, Wilton)
	Wilton 4-8 ka	Holocene microlithic
	Oakhurst 7-1 ka	Terminal Pleistocene / early Holocene non-microlithic (Albany, Lockshoek, Kuruman)
	Robberg 12-18 ka	Late Pleistocene microlithic
	early LSA 18-40 ka	(informal designation) Late Pleistocene microlithic

The ESA dates between 200 ka and 2 mya. General characteristics of the ESA include:

- Simple flakes struck from cobbles, cores and pebble tools;
- Intentionally shaped handaxes, cleavers and picks during the later stages; and
- Large blades in the final or transitional stages.

ESA surface scatters have been investigated at Waterval Drift I off the N2 near Piet Retief and approximately 25 km north east of the Project Area.

MSA sites dating from c. 30 000 to 100 000 Before Present (BP) are known by archaeologists to occur within the Study Area. The MSA dates between 20 ka and 300 ka. A key technique characteristic of the MSA is the Levallois or prepared core technique in which triangular flakes with convergent dorsal scars, often with faceted striking platforms, are produced. Discoidal systems and intentional blade production from volumetric cores also occur within the MSA. The general characteristics of the MSA include:

- Formal tools such as:
    - Unifacial and bifacial retouched points;
    - Backed artefacts; and
    - Scrapers and denticulates.
- Evidence of shafted tools;
- Occasional marine shell beads;
- Bone points;

- Engraved ochre nodules;
- Engraved ostrich eggshell (OES) fragments;
- Engraved bone fragments; and
- Grindstones.

Within the Study Area, MSA assemblages are commonly found as surface scatters of flaked stone. MSA surface scatters have been investigated at Waterval Drift I and Waterval Drift II off the N2 nears Piet Retief and approximately 25 km north east of the Project Area.

LSA and rock art sites may also occur in the Study Area [1] and are particularly associated with shelters in sandstone cliffs or outcrops. The LSA dates between 20 ka and 40 ka. The economy of the LSA may be associated with hunter-gatherer or herder societies. Within the LSA, there is much variability between assemblages. Stone tool assemblages are often microlithic but in some areas they are dominated by long scrapers and few backed microliths. The LSA includes a wide range of formal tools such as:

- Scrapers;
- Backed artefacts;
- Shafted stone and bone tools;
- Borers;
- Upper and lower grindstones;
- Grooved stones;
- OES beads;
- Undecorated and decorated OES fragments;
- Flask and/or flask fragments;
- Bone tools;
- Fishing equipment;
- Rock art; and
- Ceramics.

Within the Study Area, LSA surface scatters have been identified and recorded to occur at Twyfelaar, Waterval Drift II, Idalia, Rustplaas, and Oak Harbour (University of the Witwatersrand, 2010). These sites are located off the N2 near Piet Retief, approximately between 23 km and 39 km north east of the Project Area.

An important (in the context of archaeology) recent rock art site discovery, is an archaeological site complex at De Wittekrans located approximately 100 km north-east of the Project Area. The discovery was made in 2008 during an AIA and subsequently assessed by Ouzman (2009). Although the site complex is relatively far from the Project Area (approximately 100km away), its location in the landscape is sufficiently similar to the landscape in the Project Area, thus allowing inference that similar sites may exist. The

[1] no rock art sites were found in the proposed development area; however, previous sitings in the Study Area were recorded in literature. This is discussed in more detail later in this report.

following description as well as *Figure 4.5* to *Figure 4.7* are taken from the report (Ouzman, 2009):

The four sites located to date occur on a low sandstone outcrop less than 500m northeast of the Klein Olifants River (indicated in Figure 4.5). The largest site spatially occurs at the waterfall, while three similar sites – which include the most densely painted site – occur within 400 m to the west of the sandstone outcrop. All of the sites have associated archaeological deposit, with some stone tools and pottery visible on the surface in and around the sites. There are at least two kinds of rock art at De Wittekrans: Fine-line, brush-painted rock paintings made by hunter-gatherers ancestral to today's 'San/Bushman' (illustrated in Figure 4.6); and

Finger-painted rock paintings made by Khoekhoen herder peoples, formerly known as 'Khoi' or 'Hottentot' (illustrated in Figure 4.7).

Both these forms of rock art are significant at local, regional, and national levels. San rock art is known to be of great spiritual and symbolic significance, while Khoekhoen rock art is as yet imperfectly understood and through to relate to initiation and group identity. Furthermore, the co-occurrence of both forms of rock art at De Wittekrans are evidence of possible contact and communication between these groups – something about which little is known. De Wittekrans is thus a key site – one of the top 3 in South Africa – in terms of Khoekhoen herder art research, and must be preserved at all costs.

Figure 4.5 View of the De Wittekrans Site Complex (Source: Ouzman 2009)

Figure 4.6 *An example of a 'San' Rock Painting from De Wittekrans (Source: Ouzman 2009)*

Figure 4.7 *An Example of a 'Khoekhoen' Rock Painting from De Wittekrans (Source: Ouzman 2009)*

4.4.2 Iron Age

The Iron Age in South Africa is divided into three periods:

- Early Iron Age;
- Middle Iron Age; and
- Late Iron Age.

The Stone Age is followed by the Iron Age which continues well into the Historic Period (c. 1840 onwards). Sites including pottery, grain bin foundations, stone foundations and low kraal walls have been identified in Robertsdrift approximately 100km from the Project Area. Stonewalled sites have previously (in 2006) also been recorded within the Study Area (Van Schalkwyk, 2006).

An aerial imagery survey in a previous heritage study (Derricourt & Evers, 1973), led to the discovery of an Iron Age settlement known as Robertsdrift. The site is a Type V [(1)] settlement at the confluence of the Vaal and Klip rivers outside Standerton approximately 100 km west of the Project Area. Excavations were carried out in the 1970s during which ceramics with comb stamping motifs were identified (Derricourt & Evers, 1973).

Other Iron Age sites include Tafelkop and Tafelkop II on the farm Tafelkop 270 IS approximately 80 km north west of the Project Area. These Late Iron Age sites comprise Moloko ceramics and Type V stone walling.Towards the south east and approximately 100 km from the Project Area, heritage studies have documented sites known as Kupwal 14.74 on the farm Kupwal 49 HU and Kortnek on the farm Kortnek 50 HU (University of the Witwatersrand, 2010). These sites have been recorded as Iron Age smelting sites with stone walling.

Battlefields from the Mfecane era, approximately from 1815 to 1840, are located within the Study Area and 50 km south east of the Project Area. According to Huffman and van der Merwe (1993), the capital of a Swazi chief, Mandla-angangawempisi (Mandlangampisi), was situated on Kafferkraal 98 HT between 1780 and 1840 (Huffman & van der Merwe, 1993). Mandlangampisi is reputed to have fought and been victorious in two battles against Zulu warriors during the Mfecane period. One specific battle took place in or near a cave known as Mhlogamvula in the KwaMandlangampisi mountain range approximately 20 km south east of the Project Area.

4.4.3 Historic Period

The Project Area is situated in the centre of KwaYende, an area that includes Heyshope Dam. Today, the capital of KwaYende lies approximately 9 km east of the Project Area. The tribal area of KwaYende (previously KwaNgema) is the traditional settlement of Mthonga, the first-born son of Shaka Zulu's half-brother Mpande. Mthonga was a catalyst for the first European settlements. In the mid-19th century, Mthonga fled KwaZulu-Natal to escape Cetshwayo. In

[1] Type V stone walling consists of the standard core of cattle enclosures surrounding beehive houses and grain bins. Corbelled huts may be present with this type of stone walling (Maggs, 1976).

return for their assistance in finding and handing Mthonga over, Mpande granted the early Boers settlement rights in the region in 1854. Mathonga fled but was captured by the Boers in March 1861 and handed over to Cetshwayo in exchange for a land agreement (Wakkerstroom Tourism, 2012).

Historically, European settlement occurred from as early as the mid-1830s when Cape Dutch migrants, the *Voortrekkers* and precursors of what would become Afrikaner Boers, entered the region. Some of the first to settle in the region were Boers who left the former Natal (now KwaZulu-Natal) after the Boer Republic of Natalia was annexed by the British. Among these were Dirk Uys who surveyed a town he named 'Uysenburg' approximately 40 km south west of the Project Area. The town was later renamed Marthinus Wesselstroom that was in turn named Wakkerstroom. Dirk Uys is also credited as the 'father' of the Drakensberger cattle race (Uys, 1976). The first towns to be established in the region were those of Utrecht approximately 60 km south of the Project Area, Uysenburg (Wakkerstroom), and Volksrust approximately 56 km south west of the Project Area.

Remnants of these early European settlers are scattered across the region and include stonewalled foundations and old oak trees (Huffman & Steel, 1995).

The region saw military action during the First Anglo-Boer War (1880 to 1881) and the Second Anglo-Boer War (1899 to 1902). Citizens of the *Zuid-Afrikaansche Republiek* known as *Burghers* from the surrounding towns and surrounding farms of Wakkerstroom, Piet Retief, Volksrust and others, formed commandos that engaged invading British forces in several places. Important nearby battlefields include Amajuba (1881) and Lancaster Hill (1900) approximately 90 km south of the Project Area near Vryheid, KwaZulu-Natal (Coghlan, 1996). During the Second Anglo-Boer War, the British established many infamous concentration camps one of which was located at Volksrust.

In 1902, the British attempted to erect telegraph lines between Pretoria and Piet Retief while advancing eastwards to Ermelo where they planned to surround the Boer forces who had gathered there (Hippisley, 1903). The telegraph lines were put up only for the Boers to cut them down again thereby preventing the British troops from communicating with Pretoria and other columns.

Eventually, the British troops under the leadership of General French reached Piet Retief and erected telegraph lines to connect Standerton via Newcastle and Utrecht to the Pongola River at Luneburg (Hippisley, 1903). This particular line was established in 1901 and was 104 km long. Military posts were established all along the line. Another telegraph line was established and operated from 14 February 1901 to 15 March 1901. In total, four telegraph lines were constructed from Piet Retief:

- Utrecht Piet Retief line (104 km);
- Piet Retief Zandbank line (24 km)

- Piet Retief Annyspruit (32 km); and
- Piet Retief Vryheid line (13 km).

In 1901, a military office was opened in Piet Retief. To restrict the guerrilla tactics of the Boers during the latter phase of the war, an extensive defensive blockhouse system was created by the British. Of the more than 9 000 blockhouses that were constructed, more than 130 were located between Volksrust and the Swaziland border outside of Piet Retief and approximately 60 km east from the Project Area (Wakkerstroom Tourism, 2012). One particular blockhouse extended from Volksrust to Swaziland and passed Piet Retief. This blockhouse line was approximately 129 km long and had five telegraph offices with 32 telephones (Hippisley, 1903). Another blockhouse line from Wakkerstroom to Piet Retief has an Amsterdam office situated near the present day Dirkieskop approximately 16 km south of the Project Area.

The above information indicates that there was a British and Boer presence within the vicinity of the Project Area. Heritage resources pertaining to this period of history may be present within the Project Area. The sites describe above are approximately between 23 km and 100 km of the Project Area and will not be affected by the proposed Project.

4.4.4 Social History

The most recent history includes attempted forced removals of local communities during the 1980s, significantly from the Driefontein and KwaYende areas. KwaNgema is located approximately 10 km east of the Project Area. It was a 'Black freehold' settlement granted to the community in 1904. Driefontein is located approximately 4 km east of the Project Area and unlike KwaNgema it was bought by the community in 1912 (Ndaba, 1998). Due to these settlements' proximity to 'white' areas, they were declared as 'Blackspots' in 1965 and earmarked for forced relocation to KaNgwane and KwaZulu – two former Black homelands. However, only in 1981 when the Heyshope Dam was due to be constructed did relocation become certain as the dam would flood parts of both settlements. There were high levels of resistance from the communities who were adamant against the resettlement. Various churches and organisations within South Africa including the Black Sash, a women's resistance group, voiced their concern to government on the forced removal of residents in Driefontein (NASA - BAO; 2/4324;T8/7/2/2/W1/3).

New areas were proposed for resettlement for the two groups that had been identified in the Driefontein community: the Zulu and the Swazi. The proposed resettlement site for the Swazi people was in an area near Oshoek at the Oshoek border post between South Africa and Swaziland approximately 100 km north east of the Project Area. The Swaziland government did not approve of this as they felt it may create a refugee situation (NASA – BAO; 2/4304/T8/7/2/2/W1/3). During negotiations, several community protests occurred such as one in June 1983 where a crowd of 1 000 residents chanted "*We are not going away*" (Rand Daily Mail, 1983). Some negotiations turned

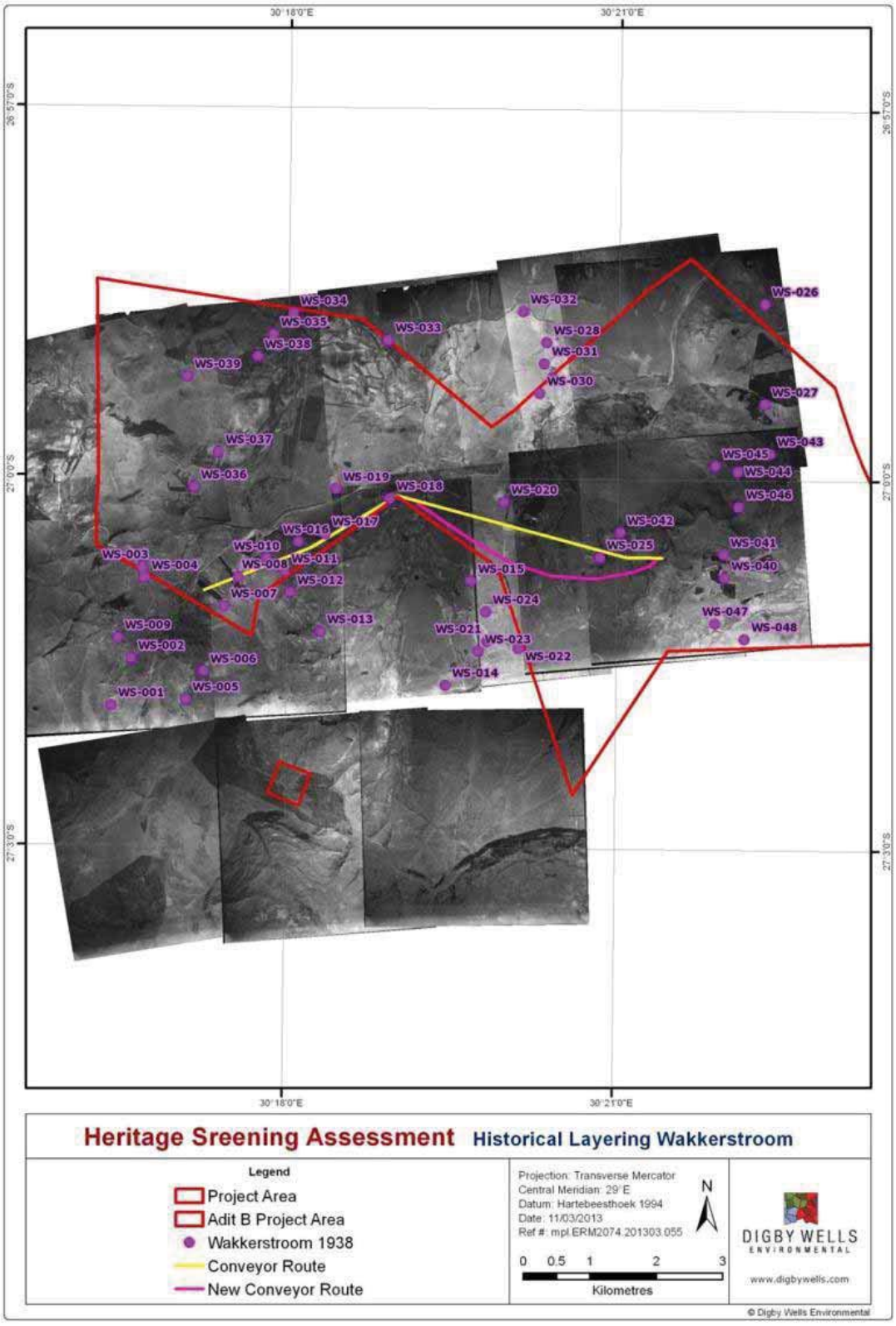
violent and at least one activist and community leader, Saul Mkhize, was gunned down by police during the period of resistance on 2 April 1983 (BAO; 2/4304/T8/7/2/2/W1/3). This caused uproar within the community and increased protests against the resettlement. Opposition and activism took place between 1981 and 1985. A ruling was made in favour of the two communities and wholesale removal was avoided.

A major cause of concern within the community was the rising water table which was caused by the construction of the Heyshope Dam and which resulted in water damage to many homes in close proximity to the dam. There were also concerns regarding the exhumation and the temporary reburial of such graves, causing much anger in the community. During a meeting on 10 November 1984, an individual by the name of Shadrack Mkhize states [translation] "*As tombs move, move the people. You use the dam to let [verskuif] us*" (BAO; 4/2903; T8/7/2/2/W1/3).

This shows that there was a historical notion of resistance and mistrust to relocation. That being said compensation was also awarded to families who were relocated. Only those whose properties were flooded were resettled on adjacent land and retained their property rights (Ndaba, 1998). Compensation was offered to affected property owners to reimburse them of any improvements made to their properties that would be destroyed by the construction of the dam (BAO; 2/4324; T8/7/2/2/W1/3).

A survey of historical aerial photographs showed that a number of possible structures occurred in the Project Area from 1938 to 1955 (Figure 4.8). These structures could include residential complexes, homesteads and stone walls. The numbering of the possible structures includes the town name, in this case Wakkerstroom (WS), suffixed by the structure number. The strutures located in the Main Mine Adit, Adit B and the conveyor route were verified by the HIA fieldwork. Only one possible structure identified in the aerial photograph was verified by the HIA fieldwork and this is discussed in more detail in *Section* 5.2 on *Page* 5-5.

Figure 4.8 Historical Aerial Photograph from 1938 Showing Structures Located within the Project Area



Based on the above sections, the landscape may thus be described as an agrarian landscape with a deep time depth, increasing the potential of sites existing from as early as the MSA through to rock art and the Iron Age and into the historic period.

4.5 HERITAGE BASELINE

4.5.1 *Screening Assessment*

A screening assessment of the Project Area was undertaken by Johan Nel (Unit Manager: Heritage Resources Management at Digby Wells) on 6 December 2012. The assessment comprised both vehicular and pedestrian surveys of the proposed conveyor route.

The screening assessment identified 15 sites and/or landscape features (*Table 4.3*). The identified sites included historical burial grounds and farmsteads, a Late Iron Age/Historical settlement, and modern settlements with associated burial grounds. Sensitive landscape features that were identified included sandstone ridges and low, boulder-strewn hills.

Sites identified during the screening assessment were named using the Digby Wells project number, followed by the map sheet number and reference to the relevant NHRA section suffixed with the site number: **ERM2074/2730AB/S.35-001**. This number was shortened to the NHRA reference number suffixed with the site number: **S.35-001**.

The NHRA reference numbers and designations are as follows:

- ***S.34*** – structures;
- ***S.35*** – archaeology, palaeontology and/or meteorites;
- ***S.36*** – burial grounds and graves; and
- ***S.37*** – public monuments and memorials.

Table 4.3 Sites Identified and Recorded during the Screening Assessment of the Proposed Conveyor Route Conducted by Digby Wells

Site ID	Coordinates	Description
ERM1990/2730AB/S.34-001	27⁰ 00′ 18.7″ S 30⁰ 20′ 14.9″ E	Foundations and ruins of historical homestead.
ERM1990/2730AB/S.36-002	27⁰ 00′ 24.6″ S 30⁰ 20′ 13.7″ E	Burial ground, probably associated with S.34-001
ERM1990/2730AB/S.35-003	27⁰ 00′ 20.8″ S 30⁰ 20′ 04.0″ E	Archaeological, early historical homestead and possible graves
ERM1990/2730AB/S.35-004	27⁰ 00′ 20.9″ S 30⁰ 20′ 04.0″ E	Archaeological, early historical homestead and possible graves
ERM1990/2730AB/S.36-005	27⁰ 00′ 09.7″ S 30⁰ 18′ 52.5″ E	Burial ground, at least 10 graves associated with Yende family
ERM1990/2730AB/S.35-006	27⁰ 00′ 40.2″ S	Landscape feature, sandstone

Site ID	Coordinates	Description
	30⁰ 18′ 00.6″ E	outcrop with potential for rock art and palaeontology, also possible historical quarry.
ERM1990/2730AB/S.35-007	27⁰ 00′ 35.8″ S 30⁰ 18′ 09.1″ E	Landscape feature, sandstone outcrop with potential for rock art and palaeontology, also possible historical quarry.
ERM1990/2730AB/008	27⁰ 00′ 41.2″ S 30⁰ 17′ 49.2″ E	Soccer field
ERM1990/2730AB/009	27⁰ 00′ 41.6″ S 30⁰ 17′ 29.4″ E	Large rural homestead
ERM1990/2730AB/S.34-010	27⁰ 00′ 49.6″ S 30⁰ 17′ 27.8″ E	Foundations and ruins of historical homestead, two old oak trees and several large jacaranda trees present.
ERM1990/2730AB/S.35-011	27⁰ 00′ 05.0″ S 30⁰ 19′ 57.5″ E	Burial ground comprising at least five graves.
ERM1990/2730AB/S.36-013	27⁰ 00′ 42.7″ S 30⁰ 17′ 49.0″ E	Alleged Yende burial ground in black-wattle bush
ERM1990/2730AB/S.35-014	27⁰ 00′ 12.7″ S 30⁰ 21′ 03.5″ E	Low, boulder-strewn hill
ERM1990/2730AB/S.36-015	27⁰ 01′ 02.2″ S 30⁰ 17′ 15.3″ E	Large cemetery comprising more than 30 graves, associated with Masondo family.

The impacts associated with sites mentioned in *Table 4.3* above are discussed in *Section 5* of this report.

4.5.2 *Previous Impact Assessment Studies*

A review of relevant impact assessments that had been previously conducted in the surrounding areas was completed to ascertain what type of heritage resources have been identified within the Study Area. The following reports were consulted:

- Huffman, T. N. & van der Merwe, H. D. R., 1993. *Archaeological Survey for Savemore Colliery*, Johannesburg: Archaeological Resources Management.

- Huffman, T. N. & Steel, R., 1995. *Archaeological Survey of Balgarthan Colliery*, Johannesburg: Archaeological Resources Management.

- Anderson, G., 1998. *Archaeological Survey of the Proposed Route for the Pongola-Vergenoeg Transmission Line*, Pietermaritzburg: Institute for Cultural Resource Management.

- Van Schalkwyk, J., 2005. *Heritage Impact Assessment for the Proposed Development on the Farm Evergreen 425 IT, Piet Retief District, Mpumalanga Province*, Pretoria: National Cultural History Museum.

- Van Schalkwyk, L., 2006. *Heritage Impact Assessment for the Majuba-Umfolozi 765 KV Transmission Line in Mpumalanga and KwaZulu-Natal, South Africa*, Pietermaritzburg: eThembeni Cultural Heritage.

- Pistorius, J. C. C., 2011. *A heritage Baseline Study for Proposed Adit Positions in a Project Area near the Heyshope Dam to the West of Piet Retief in the Mpumalanga Province of South Africa*. Johannesburg: Environmental Resources Management (Southern Africa) Pty Ltd (ERM).

The archaeological survey conducted by **Huffman and van der Merwe** (1993) for the Savemore Colliery was carried out approximately 16 km south east of the Project Area. A total of six sites were identified during the survey. These included Stone Age lithics, Late Iron Age ceramics and grain bin foundations as well as foundations for a historical structure (Huffman & van der Merwe, 1993).

The archaeological survey conducted by **Huffman and Steel** (1995) for the Balgarthan Colliery was carried out approximately 4 km south of the Project Area. A total of seven Swazi homesteads, one recent dwelling and one European farmhouse were identified during the survey (Huffman & Steel, 1995).

The archaeological survey conducted by **Anderson** (1998) for the Pongola-Vergenoeg transmission line was carried out approximately 94 km south east of the Project Area. During the survey, a total of seven Iron Age stone walled sites were identified, five of which contained graves (Anderson, 1998).

A HIA conducted by **Van Schalkwyk** (2005) for a proposed development on the farm Evergreen 425 IT was carried out approximately 49 km north east of the Project Area. A scatter of iron smelting slag was identified and recorded during the survey (Van Schalkwyk, 2005).

A HIA conducted by **Van Schalkwyk** (2006) for the Majuba-Umfolozi 765 KV transmission line was carried out approximately 26 km south of the Project Area over a 160 km distance. During the study, it was found that a number of heritage resources were located within the Majuba-Umfolozi development area. These include the following sites that lie within and immediately adjacent to the Study Area:

- Ancestral graves;
- Rock painting sites that were recorded along and below the eastern uKhahlamba escarpment;
- Stone Age open air sites [1];
- Stone walled settlements dating to the Late Iron Age;
- Battlefields of:

    - Majuba (1887);
    - Hlobane (1879);
    - Holkrantz (1879);
    - Khambula (1879);

[1] Open air sites are sites that are in the open as opposed to being in a shelter or cave.

- Bloed River's Poort (1879);
- Ncome/Bloed River (1838);
- Fort Newdigate (1879); and
- Price Imperial's capture site (1879).

A heritage baseline study conducted by **Pistorius** (2011) for the construction of three proposed adits by Kangra Coal was carried out within the Project Area. During the study, five heritage resources were identified and recorded (Pistorius, 2011). These include the following sites:

Table 4.4 ***Sites Identified and Recorded during the Heritage Baseline Assessment by Pistorius (2011)***

Site ID	Coordinates	Description
G01	27^0 01′ 04.3″ S 30^0 17′ 24.3″ E	A single, historic informal grave with stone dressing
CE01	27^0 03′ 21.1″ S 30^0 14′ 51.1″ E	A single square cattle enclosure
LIA01	27^0 02′ 50.5″ S 30^0 22′ 38.0″ E	A Late Iron Age site with stone wall enclosures
GY01	27^0 03′ 18.4″ S 30^0 14′ 45.8″ E	A historical graveyard demarcated with stone walling
SB	27^0 03′ 39.9″ S 30^0 19′ 03.3″ E	A sandstone bank that may be associated with Stone Age sites

All of the site mentioned in *Table 4.4* are located outside of the footprint of proposed Project, and will therefore not be directly impacted on.

From these reports, heritage resources such as Stone Age sites, Iron Age settlements, historical structures and battlefields, and burial grounds and graves were identified in the Study Area.

5 IMPACT ASSESSMENT AND MITIGATION

The predicted impacts to the heritage environment as a result of the proposed Project are described in this chapter. The heritage resources that will be discussed in this chapter are only those that will be impacted upon by the proposed development. These include Section 35 archaeological and historical resources and Section 36 burial grounds and graves.

The GPS track log and position of sites identified as part of this Heritage Impact Assessment are depicted in *Figure 5.1* and *Figure 5.2*.

Figure 5.1 GPS Track Log 1:50 000

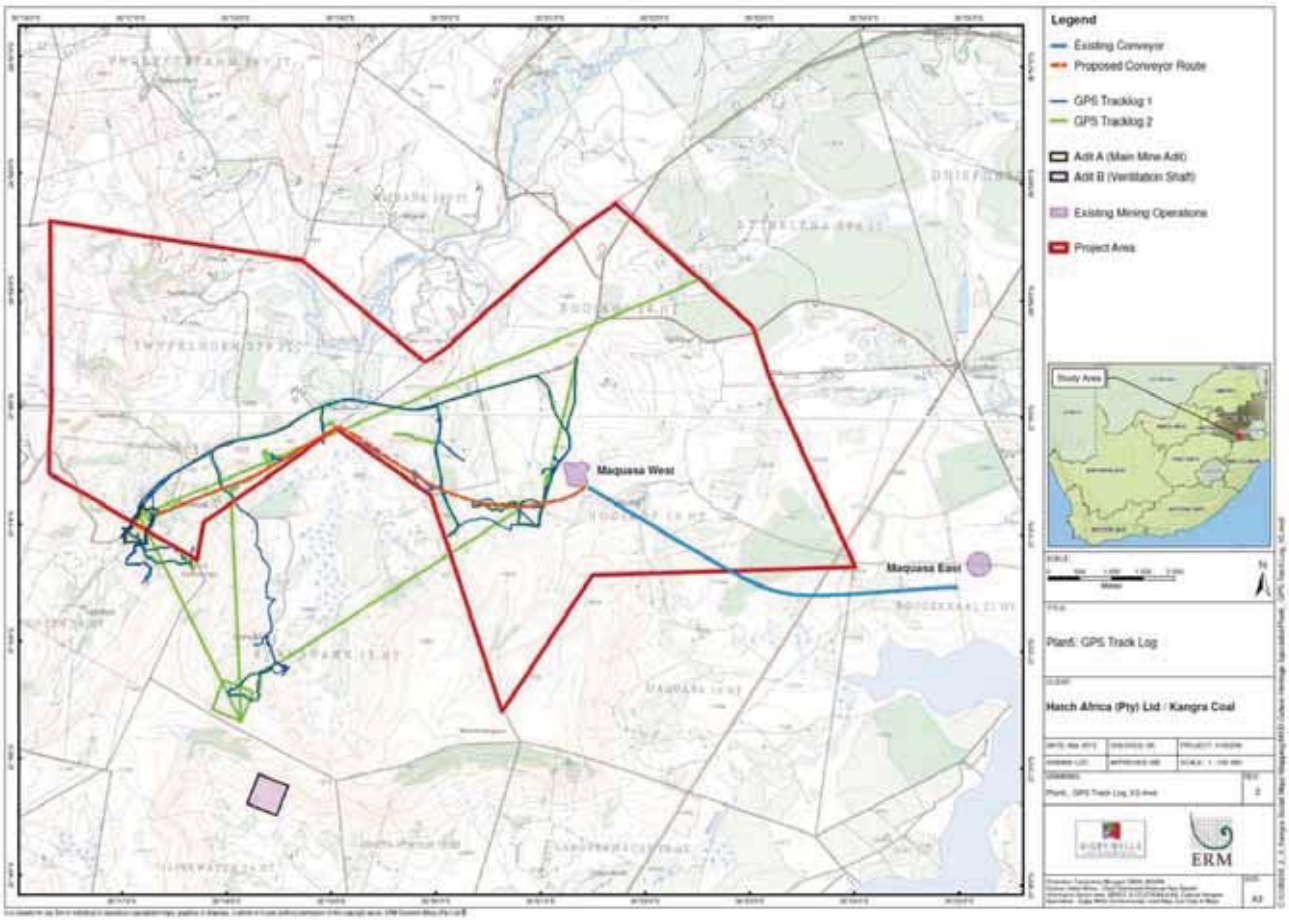
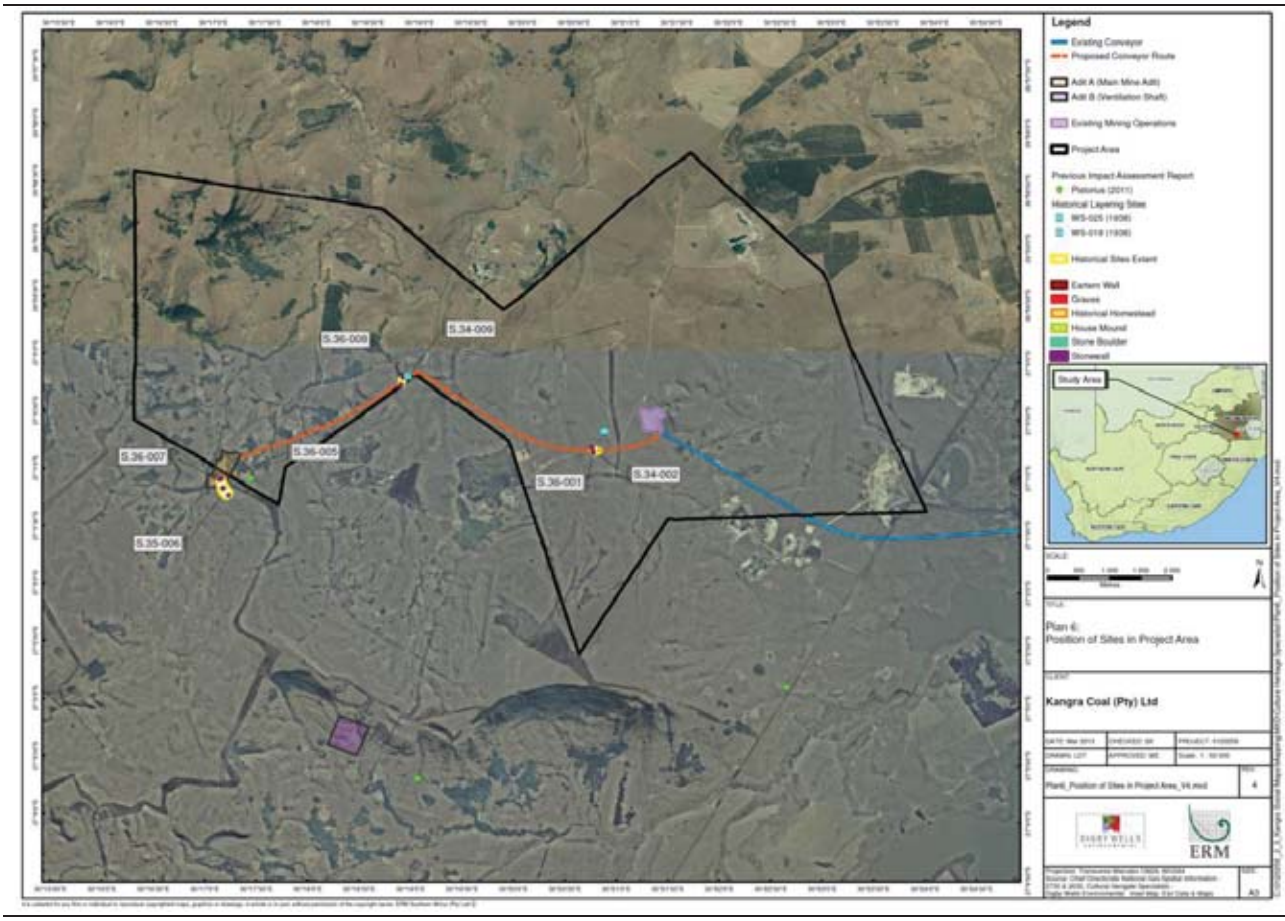


Figure 5.2 ***Position of Sites in Project Area 1:10 000***



5.1 IMPACTS ON THE PALAEONTOLOGY (1) IN THE STUDY AREA

5.1.1 Description of the Baseline Environment

The stratigraphy of the Project Area consists of the Madzaringwe Formation of the Ecca Group. The Madzaringwe Formation consists of lenses of sandstone and shale and contains a number of coal seams. Lenses of calcareous sandstone and sandy limestone are relatively common. The rocks of the Ecca Group are of palaeontological importance and the desktop research done indicates that there may be fossils in the Study Area which could be encountered when construction and mining commences.

5.1.2 Proposed Project Activities

Construction activities relating to the Main Mine Adit and Adit B that could impact on potential fossil heritage (beneath ground surface) include earth moving activities and excavations for civil works. Machinery involved in excavation may damage or destroy fossils, or they may be hidden within the excavated material.

5.1.3 Sensitive Receptors

Fossils may be affected by Project activities discussed in *Section 5.1.2* above. The existence of subsurface fossils is unknown because no excavations have taken place in the general area. If subsurface fossils exist they could be found during site construction.

5.1.4 Impact

During the field survey, no surface fossils were identified along the proposed conveyor routes or within the Adit A and Adit B footprints. However, one must make the assumption that most fossil heritage is embedded within the rocks beneath the land surface or obscured by surface deposits such as alluvium or soil and by vegetation cover.

Fossils plants are not well preserved in coal seams due to the natural coalification process where the fossil plants undergo changes from peat to lignite to bituminous coal. According to Section 2 (xxxi) of the NHRA, these fossil fuels along with fossiliferous rocks intended for industrial use are not included in the definition of palaeontological resources.

Fossilised remains or trace fossils of animals or plants which lived in the geological past do occur in the shales associated with the coal seams. These palaeontological remains are defined as heritage resources in Section 2 (xxxi) of the NHRA but there existence beneath the surface can only be verified through monitoring excavations. **In this sense, the impact of construction**

(1) ***Please Note*** – a standalone Palaeontological study was not completed; rather, the palaeontological study forms an integrated component of this HIA.

activities such as excavations is positive for palaeontology, provided that efforts are made to monitor and rescue the fossils.

5.1.5 Recommendation and Mitigation/Management Measures

Subsurface fossils fall under the protection and management of the Chance Find Procedure. It is therefore recommended that the Chance Find and Fossil Find Procedures be implemented during the construction and mining phases of the Main Mine Adit and Adit B. Refer to *Appendix C* for the Chance Find and Fossil Find Procedures.

An appointed Environmental Control Officer (ECO) should be trained to identify palaeontological resources and should be present on site during the construction and mining phases. This monitoring may be limited to overburden dumps in which fossil material may be deposited with overburden material.

5.2 IMPACTS ON SECTION 34 SITES – STRUCTURES

Two Section 34 Sites (as defined by NHRA) were identified on the Project Site. Both sites are older than 60 years and are therefore protected in terms of Section 34 of the NHRA. These sites, which are historical stone wall structures, are described separately below:

1. **S.34-002** – the coordinates are 27^0 00′ 47.57″ S and 30^0 20′ 45.88″ E. The site is a multi-component, historical srtucture that corresponded to a 1938 aerial photograph in which residential structures were identified (*Figure 5.3*). See point WS-025 in Figure 5.5 on *Page 5-8*.

2. **S.34-009** – the coordinates are 27^0 00′ 12.62″ S and 30^0 18′ 52.07″ E. The site is a multi-component, residential structure that corresponded to a 1938 aerial photograph in which other residential structures were identified (*Figure 5.4*). See point WS-018 in *Figure 5.6* on *Page 5-10.*

The locations of these structures in the Project Area are illustrated on *Figure 5.2* on *Page 5-3*.

Figure 5.3 ***Historical Structure S.34-002 Corresponding to a 1938 Historical Aerial Photograph***

Figure 5.4 ***Historical Structure S.34-009 Corresponding to a 1938 Historical Aerial Photograph***

5.2.1 Description of the Baseline Environment

1. **S.34-002** is approximately 19 234 square meters in extent and is bisected by the proposed overland conveyor route (*Figure 5.5*). This heritage resource has no value in aesthetic and technical characteristics, as it is known to occur frequently within the Study Area. In addition, a survey of the historical 1938 aerial photograph indicates that sites similar to S.34-002 are a common occurrence within the Study Area. The site is in a poor condition with active decay visible. Contemporary use and/or occupation of the structure has resulted in the alteration of the structure to such an extent that it has limited information potential. The structure is located near an existing community and burial ground (S.36-001) and may have an association to the community or cultural group for social and/or spiritual reasons. Taking these characteristics into account, the structure was given **a low heritage value**.

Figure 5.5 Stonewalled Site (S.34 002) in Relation to the Overland Conveyor System indicated as the orange line in the figure

2. **S.34-009** is approximately 12 367 square meters in extent and is bisected by the proposed overland conveyor route (*Figure 5.6*). The heritage resource has no value in terms of its aesthetic and technical attributes, as structure similar to it are known to occur frequently within the Study Area. The structure is in a poor condition with active decay visible. There is no site context and as a result it has limited information to offer. The structure is located near an existing community and burial ground (S.36-005) and may have an association to the community or cultural group for cultural and/or spiritual reasons. Taking these characteristics into account, the structure was given a **low heritage value**.

Figure 5.6 Stonewalled Site (S.34 009) in Relation to the Overland Conveyor System indicated as the orange line in the figure

5.2.2 *Proposed Project Activities*

Kangra Coal proposes to transport mined coal from the proposed Main Mine Adit in the Kusipongo Resource to the existing Maquasa West Adit via the proposed new overland conveyor system. Sites S.34-002 and S.34-009 are bisected by the proposed overland conveyor system.

The activities that are associated with the establishment and operation of the overland conveyor system have the potential to impact on these historical structures through site clearance activities. In addition, site clearance and construction of the conveyor system will increase human traffic thereby increasing the risk to these site in terms of accidental or purposeful damage or destruction. The operation and maintenance of the conveyor system will also create long-term risks associated with more regular and increased human traffic, allowing access to the sites. The construction of the conveyor system may also change the landscape character and may impact on the integrity of the sites.

5.2.3 *Sensitive Receptors*

As is mentioned above, both structures are located near existing communities and burial grounds and may have an association to the community or associated cultural group for cultural and/or spiritual reasons.

Furthermore, the existence of subsurface cultural remains is unknown because no excavations have taken place in the general area. If subsurface cultural remains do exist they could be found during site construction. Subsurface cultural remains fall under the protection and management of the Chance Find Procedure outlined in *Appendix C*.

5.2.4 *Significance of Impact (Pre-mitigation)*

The impact related to the construction of the proposed conveyor system on the heritage sites will be a '**Negligible to Minor Negative Impact'** (*Table 5.1*). This significance is attributed to the fact that both heritage resources have a low heritage value.

Table 5.1 Rating of Impacts Related to Section 34 Sites (Structures) (Pre-Mitigation)

Type of Impact		
Direct or Indirect Negative Impact		
Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	High	Most or the entire heritage resource could be affected by the construction of the proposed conveyor route.
Duration	Permanent	Unless avoided, the structures will be destroyed by groundworks during the construction phase of the proposed Project.

Intensity	Low	Change to integrity will cause change to overall authentic aspects of the heritage resource, as the structure will be partly or completely destroyed by the construction of the proposed overland conveyor; however, the heritage resource is of a low heritage value and therefore any change to the heritage resource as a result of the Project is not significant.
Probability	Probable	Construction activities will take place on certain portions of the heritage site.
Magnitude		
Low Magnitude		
Value of the Resource/Receptor		
Low Sensitivity		
The heritage resource is of a low heritage value and therefore any change to the heritage resource as a result of the Project is not significant; however, this said both structures are located near existing communities and burial grounds and may have an association to the community or associated cultural group for cultural and/or spiritual reasons.		
Significant Rating Before Mitigation		
Negligible to Minor Negative Impact		

5.2.5 *Recommendations and Mitigation/Management Measures*

The heritage resources are generally protected and their field rating is Grade IVB, which means that no Project-related mitigation measures were recommended for the site (see the Field Rating guide in *Section 3.5* for a description of the field ratings). The sites were significantly recorded and mapped in the HIA and they can be destroyed; however, prior to its destruction, Kangra Coal will confirm whether the communities are using the site as part of a ceremonial area and a destruction permit must initially be obtained from SAHRA.

The following management measure must be implemented during the construction phase of the proposed Project:

- The appointed Environmental Control Officer (ECO) should be trained to identify heritage resources and should be present on site when ground clearing inside the perimeter (defined by the extent of the site presented in *Section 5.2.1* above) of the heritage resource takes place. The ECO should be able to monitor any potential subsurface exposure of material culture.

5.2.6 *Residual Impact (Post-mitigation)*

There are no Project-related mitigation measures recommended for this site. However, the heritage-related mitigation measures were implemented as both heritage resources were adequately recorded and mapped and can therefore be destroyed. The above mentioned heritage-related mitigation measures will keep the level of significance for this impact to a **'Negligible Negative Impact'** (*Table 5.2*).

Table 5.2 Rating of Residual Impacts Related to Section 34 Sites (Structures) (Post-Mitigation)

Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	High	Most or the entire heritage resource could be affected by the construction of the proposed conveyor route.
Duration	Permanent	Unless avoided, the structures will be destroyed by groundworks during the construction phase of the proposed Project.
Intensity	Low	Change to integrity will cause change to overall authentic aspects of the heritage resource, as the structure will be partly or completely destroyed by the construction of the proposed overland conveyor; however, the heritage resource is of a low heritage value and therefore any change to the heritage resource as a result of the Project is not significant.
Probability	Probable	Construction activities will take place on certain portions of the heritage site; however, the structures have been adequately recorded and mapped and this information has been stored for future reference. The site can therefore be destroyed.
Magnitude		
Low Magnitude		
Significant Rating After Mitigation		
Negligible Negative Impact		

5.3 IMPACTS ON SECTION 35 SITES - ARCHAEOLOGICAL SITES

5.3.1 IMPACTS ON THE S.35-006 Archeological Site

This site (S.35-006) is an archaeological site that is protected in terms of Section 35 of the NHRA. The coordinates for the site are S27 01 09.64 and E30 17 08.44. The site is a multi-component site that is possibly archaeological to early historical. It is a stonewalled site identified on three elevations (*Figure 5.7* to *Figure 5.10*).

The location of this structure in the Project Area is illustrated on *Figure 5.2* on *Page 5-3*.

Figure 5.7 The First Stone Wall Identified and Recorded at the Archaeological Site

Figure 5.8 The Second Stone Wall Identified and Recorded at the Archaeological Site

Figure 5.9 The Third Stone Wall Identified and Recorded at the Archaeological Site

Figure 5.10 The Fourth Stone Wall Identified and Recorded at the Archaeological Site

S.35-006 is approximately 55 807 square meters in extent and falls within the Main Mine Adit footprint (*Figure 5.11*). This heritage resource has no value in aesthetic and technical characteristics as this type of site is known to occur frequently within the Study Area. The site is in a poor condition with active decay visible. It has a limited information potential because there was no site context and no archaeological deposit (artefacts) were noted. Taking these characteristics into account, the site was given a **low heritage value**.

Figure 5.11 Stonewalled Site S.35 006 Bisected by the Main Mine Adit (Main Mine Adit illustrated as Orange Hatched Polygon)

Proposed Project Activities

Site S.35-006 falls within the footprint of the Main Mine Adit and as such will essentially be lost through earthworking activities and associated establishment of mine infrastructure.

Sensitive Receptors

The existence of subsurface cultural remains is unknown as no excavations have taken place in the general area. If subsurface cultural remains do exist, they could be found during site construction.

Significance of Impact (Pre-mitigation)

The impact from the construction of the Main Mine Adit on the heritage site will be a '**Negligible to Minor Negative Impact'** (*Table 5.3*). This significance is attributed to the fact that both heritage resources have a low heritage value and is known to occur frequently within the Study Area.

Table 5.3 Rating of Impacts Related to a Section 35 Archaeological Site (Pre-Mitigation)

Type of Impact		
Direct Negative Impact		
Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	High	As the archaeological resource falls within the footprint of the Main Mine Adit, it will essentially be lost.
Duration	Permanent	Unless avoided, the structures will be destroyed by groundworks during the construction phase of the proposed Project.
Intensity	Low	Change to integrity will cause change to overall authentic aspects of the heritage resource, because the site will be destroyed by the construction of Adit A. However, the heritage site has no value in aesthetic and technical characteristics as this type of site is known to occur frequently within the Study Area. The site is in a poor condition with active decay visible. It has a limited information potential because there was no site context and no archaeological deposit (artefacts) were noted. As such, the site was given a low heritage value.
Probability	Probable	Should the proposed Adit A be constructed, the heritage resource will be lost.
Magnitude		
Low Magnitude		
Value of the Resource/Receptor		
Low to Negligible Sensitivity		
The heritage resource is of a low heritage value and therefore any change to the heritage resource as a result of the Project is not significant.		
Significant Rating Before Mitigation		
Negligible to Minor Negative Impact		

Recommendations and Mitigation/Management Measures

Subsurface cultural remains fall under the protection and management of the Chance Find Procedures outline in *Appendix C*.

The heritage resource is generally protected and their field rating is Grade IVB, which means that no Project-related mitigation measures were recommended for the site (see the Field Rating guide in *Section 3.5* for a description of the field ratings). The site was significantly recorded and mapped in the HIA and no further mitigation measures are required.

The following management measure must be implemented during the construction phase of the proposed Project:

- The appointed Environmental Control Officer (ECO) should be trained to identify heritage resources and should be present on site when ground clearing inside the perimeter (defined by the extent of the site) of the heritage resource takes place. The ECO should be able to monitor any potential subsurface exposure of material culture.

Residual Impact (Post-mitigation)

There are no Project-related mitigation measures recommended for this site. However, the heritage-related mitigation measures were implemented as the heritage resource was adequately recorded and mapped and can therefore be destroyed. The above mentioned heritage-related mitigation measures will keep the level of significance for this impact to a **'Negligible Negative Impact'** (*Table 5.4*).

Table 5.4 Rating of Residual Impacts to a Section 35 Archaeological Site (Post-Mitigation)

Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	High	As the archaeological resource falls within the footprint of the Main Mine Adit, it will essentially be lost.
Duration	Permanent	Unless avoided, the structures will be destroyed by groundworks during the construction phase of the proposed Project.
Intensity	Low	Change to the integrity of the heritage resource will not cause changes to its authenticity because the heritage resource has been adequately recorded and mapped and the information stored.
Probability	Probable	Project-related mitigation measures, if required, will not avoid change and the site will be destroyed.
Magnitude		
Low Magnitude		
Significant Rating After Mitigation		
Negligible Negative Impact		

5.4 IMPACTS ON SECTION 36 SITES – BURIAL GROUNDS AND GRAVES

5.4.1 Impacts on the S.36-001 Burial Ground

This site is a burial ground that is protected in terms of Section 36 of the NHRA. The coordinates are S27 00 48.99 and E30 20 43.78. The site is associated with the multi-component historical site S.34-002. .

Figure 5.12 Grave Identified and Recorded in Burial Ground Site

The location of this structure in the Project Area is illustrated on *Figure 5.2* on *Page 5-3*.

Description of the Baseline Environment

S.36-001 is approximately 199 square meters in extent and comprises 11 graves. It is located 18 m south of the proposed conveyor route (*Figure 5.2*). The burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources. It is in a fair to good condition and is well preserved. There is some decay present but it can easily be restored. Based on these attributes, the burial ground was given a **medium heritage value**.

Proposed Project Activities

Activities associated with the establishment and operation of the overland conveyor system have the potential to indirectly impact on the S.36-001 heritage resource.

Although the heritage resource is situated 18 m away from the proposed conveyor route, site clearance associated with the construction of the conveyor route could destroy or cause damage to the site.

In addition, construction and operational activities associated with the proposed overland conveyor will result in increased human traffic in the Project Area, thereby increasing the risk of accidental or purposeful damage or destruction of the site. The construction of the conveyor system may change the landscape character and may impact on the integrity of site S.36-001.

Sensitive Receptors

The burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources.

Significance of Impact (Pre-mitigation)

The impact from the construction of the proposed conveyor route on the heritage site will be a '**Minor to Moderate Negative Impact'** (*Table 5.5*).

Table 5.5 Rating of Impacts Related to Burial Ground S.36 001 (Pre-Mitigation)

Type of Impact		
Direct or Indirect Negative Impact		
Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	Medium	Large parts or aspects of the heritage resource may be indirectly affected by the construction of the proposed conveyor route.
Duration	Permanent	Change to the heritage resource will be permanent and irreversible.
Intensity	Low to Medium	Change to the integrity of the heritage resource will not cause change to its authenticity. The conveyor route could only impact on the surface features of the burial ground and not on the human remains themselves which would remain intact. However, the site is in a fair to good condition and is well preserved. There is some decay present but it can easily be restored..
Probability	Unlikely	The burial ground is not situated within the footprint of the conveyor route.
Magnitude		
Low to Medium Magnitude		
Value of the Resource/Receptor		
Medium Sensitivity		
The heritage resource is of a medium heritage value. Furthermore, the burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources.		
Significant Rating Before Mitigation		
Minor to Moderate Negative Impact		

Recommendations and Mitigation/Management Measures

The resource was given a Grade III B field rating (see the Field Rating guide in *Section 3.5* for a description of the field ratings). Based on this field rating, it is recommended that the heritage resource be conserved and potential impacts to the resource be mitigated.

The following Project-related mitigation measures and site management should be implemented to reduce the significance of the impact:

- The graves should be restored where these are dilapidated, protected and conserved in perpetuity. Access to this burial ground should be negotiated with communities in the immediate area.

- A perimeter fence should be built around the burial ground and placed two meters away from the perimeter of the graves. The perimeter fence should include an entry gate to allow visits from relatives and family friends. The mine should be responsible for the maintenance of this fence.

- Detailed Project design should ensure that there is a 20m buffer between the perimeter fence and the proposed conveyor route.

- The ECO should be present on site when the fence is erected around the burial ground.

Residual Impact (Post-mitigation)

The establishment of a fence around the perimeter of the burial ground will ensure that the heritage resource is maintained for the entire LOM. As such, the residual impact will be a "**Positive Impact**".

5.4.2 Impacts on the S.36-005 and S.36-008 Burial Grounds

A further three burial grounds were identified in the vicinity of the Project Site. As with the aforementioned burial site, these three sites are protected in terms of Section 36 of the NHRA. These sites include:

1. **S.36-008** - the coordinates are S27 00 09.70 and E30 18 52.50 (refer to image of heritage resource in *Figure 5.13*). The site is possibly associated with the historical site S.34-009, which was identified and recorded during the screening assessment and mapped during the HIA.

2. **S.36-005** – the coordinates are S27 01 02.20 and E30 17 15.30 (refer to image of heritage resource in *Figure 5.14*).

Figure 5.13 Grave Identified and Recorded in Burial Ground S.36-008

Figure 5.14 Grave Identified and Recorded at Burial Ground S.36-005

The locations of the above mentioned burial grounds in the Project Area are illustrated on *Figure 5.2* on *Page 5-3*.

Description of the Baseline Environment

1. **S.36-008** is approximately 64 square meters in extent with at least six graves. It is located 82 m north west of the proposed conveyor route (*Figure 5.2*). The burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources. It is in a fair to good condition and is well preserved. There is some decay present but it can easily be restored. Based on these attributes, the burial ground was given a **medium heritage value**.

2. **S.36-005** is approximately 668 square meters in extent with at least 31 graves. It is located 30 m east of the Main Mine Adit (*Figure 5.15*). The burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources. It is in an excellent condition and is well-preserved. There is little to no decay present and little restoration is required. Based on these attributes, the burial ground was given a **medium heritage value**

Figure 5.15 Burial Ground S.36 005 Located Approximatly 30m east of the Main Mine Adit (Main Mine Adit illustrated as Orange Hatched Polygon)

Proposed Project Activities

Although these sites are situated a distance away from sites proposed for Project infrastructure, the activities that are associated with the establishment and operation of proposed Project infrastructure have the potential to impact on these burial grounds through site clearance activities. In addition, site clearance and construction activities associated with the proposed Project will increase human traffic thereby increasing the risk to these burial grounds in terms of accidental or purposeful damage or destruction. The operational phase of the proposed Project will also create long-term risks associated with more regular and increased human traffic, allowing access to the sites. Proposed Project infrastructure may also change the landscape character and may impact on the integrity of the sites.

Sensitive Receptors

Sensitive receptors for this heritage site include those community members who visit the burial ground.

Significance of Impact (Pre-mitigation)

The impact related to the construction and operation of the proposed Project on heritage sites will be a '**Minor Negative Impact'** (*Table 5.6*).

Table 5.6 Rating of Impacts Related to S.36-005 and S.36-008 Burial Ground (Pre-Mitigation)

Type of Impact		
Direct or Indirect Negative Impact		
Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	Low to Medium	Isolated parts or aspects of the heritage resource could be indirectly affected by the construction and operation of the proposed Project.
Duration	Permanent	Unless avoided, changes to the heritage resource will be indirect and may occur over the LOM.
Intensity	Medium to Low	Change to the integrity of the heritage resource will not cause change to its authenticity. Indirect impacts associated with proposed infrastructure establishment would only impact on the surface features of the burial ground and not on the human remains themselves which would remain intact.Furthermore, the burial grounds may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Their importance is also based on highly credible information sources. These burial grounds are in an poor to excellent condition and are well-preserved.
Probability	Unlikely	The burial grounds are not situated within the footprints of the infrastructure proposed.
Magnitude		
Medium to Low Magnitude		
Value of the Resource/Receptor		
Medium Sensitivity		

The heritage resources are of a medium heritage value. Project-mitigation must aim to reduce any impacts on the heritage resources as conservation is required. Furthermore, the burial grounds may have a strong association to the community or cultural group for social, cultural and spiritual reasons.
Significant Rating Before Mitigation
Minor to Moderate Negative Impact

Recommendations and Mitigation/Management Measures

The heritage resources were given a Grade III B field rating (see the Field Rating guide in *Section 3.5* for a description of the field ratings). Based on this field rating, it is recommended that the heritage resources be partly conserved and potential impacts to the resources mitigated.

The following Project-related mitigation measures and site management should be implemented in order to reduce the significance of the impact:

- The graves should be restored where these are dilapidated, protected and conserved in perpetuity. Access to this burial ground should be negotiated with communities in the immediate area.

- A perimeter fence should be built around each burial ground and placed two meters away from the perimeter of the graves. The perimeter fences should include an entry gate to allow visits from relatives and family friends. The mine should be responsible for the maintenance of these fences.

- The ECO should be present on site when these fences are been erected around the burial grounds.

Residual Impact (Post-mitigation)

The establishment of a fence around the perimeter of the burial grounds will ensure that the heritage resources are maintained for the entire LOM. As such, the residual impact will be a "**Positive Impact**".

5.4.3 Impacts on the S.36-007 Grave

This grave (coordinates are S27 01 04.96 and E30 17 06.91) is protected in terms of Section 36 of the NHRA (*Figure 5.16*). The site may be part of the multi-component archaeological site S.35-006 and is located within a circular stonewalled enclosure.

Figure 5.16 Single Grave Identified and Recorded in Site S.36-007

The locations of this grave in the Project Area is illustrated on *Figure 5.2* on *Page 5-3*.

Description of the Baseline Environment

S.36-007 is approximately 20 square meters in extent and is located within the Main Mine Adit footprint (*Figure 5.17*). The burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources. It is in a fair to good condition and is well preserved. There is some decay present but it can easily be restored. Based on these attributes, the burial ground was given a **medium heritage value**.

Figure 5.17 Single Grave (S.36 007) Located within the Main Mine Adit

Proposed Project Activities

Activities associated with the establishment and operation of Main Mine Adit will result in the loss of S.36-007, as development of the entire footprint of the Main Mine Adit is proposed.

Sensitive Receptors

As is previously mentioned, the burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources.

Significance of Impact (Pre-mitigation)

The impact related to the loss of the grave through construction of the Main Mine Adit will be a '**Major Negative Impact'** (*Table 5.7*).

Table 5.7 Rating of Impacts Related to S.36-007 Grave (Pre-Mitigation)

Type of Impact		
Direct Negative Impact		
Rating of Impacts		
Characteristic	**Designation**	**Summary of Reasoning**
Scale	High	The heritage resource will be lost.
Duration	High	Change to the heritage resource will be immediate, permanent and irreversible.
Intensity	High	Change to the integrity of the heritage resource will cause change to its overall authenticity because the impact will occur on the human remains and not just on the surface.
Probability	Certain	The grave is situated within the footprint of the Main Mine Adit (Adit A) and therefore it is certain that the grave will be lost in its entirety.
Magnitude		
High Magnitude		
Value of the Resource/Receptor		
Medium Sensitivity		
The heritage resource is of a medium heritage value. Project-mitigation must aim to reduce any impacts on the heritage resource as conservation is required. Furthermore, the burial ground may have a strong association to the community or cultural group for social, cultural and spiritual reasons. Its importance is also based on highly credible information sources.		
Significant Rating Before Mitigation		
Major Negative Impact		

5.4.4 Recommendations and Mitigation/Management Measures for Site S.36-007

No project-related mitigation measures such as changes to design or mine plan wereconsidered as the grave is located within the footprint of the Main Mine Adit (Adit A) and will never be preserved. It is therefore recommended that this grave in particular be relocated.

Grave Relocation Process

The Grave Relocation Process (GRP) consists of the following three phases that must be adhered to:

1. Consultation;
2. Permit application; and
3. Exhumation.

Burial grounds and graves are protected in terms of Section 36 of the NHRA and as such cannot be relocated without a permit issued by SAHRA. The GRP is regulated through the NHRA Regulations (Government Gazette No. 21239, Notice No. 548). A summary of each of these three phases is presented in this section.

Phase 1 - Consultation

The GRP is regulated through the NHRA Regulations (Government Gazette No. 21239, Notice No. 548). Chapter XI of the NHRA Regulations regulate the procedure for consultation regarding the burial that must include the following minimum requirements:

- Archival or documentary research regarding the origin of the grave;

- The erection of a site notice for a duration of at least 60 days at the grave displaying in all official languages of the province concerned information about the proposals affecting the site with the following details included:

    - Contact details of the Applicant and/or its nominated representative; and
    - Date by which contact must be made that must be at least seven days after the end of the notification period

- Advertising in the local press;

- Results of direct consultation with local community organisations and/or members that must include:

    - Accurate records of all actions and consultation taken;
    - Contact register of all persons and organisations contacted and their response, copies must be submitted to the SAHRA BGG Unit with the application; and
    - Details of agreements reached between the Applicant and interested parties concerning the future of the grave.

Phase 2 – Permit Application

Chapter IX of the NHRA Regulations provide the legal framework for permit applications for grave relocation. Permit applications must be made to the SAHRA BGG Unit and can only be submitted after the consultation process described above. Section 34 of the NHRA Regulations stipulate the following minimum information that must be included the permit application:

- Name and address, farm number and geographical coordinates of the grave;
- The magisterial district within which the grave is located;
- The contact details of the responsible planning authority;
- Details of the proposed exhumation and relocation;
- Motivation of the proposed exhumation, including supporting documents that may include:
    - The HIA report; and
    - Consultation report presenting results of consultation described above, including copies of agreements reached between Kangra Coal and interested parties.
- Details of the cost of the exhumation;
- The contact details, qualifications and relevant experience of the archaeologist who will be responsible;
- Contact details, identity number and signed consent of the landowner on whose property the grave is situated; and
- Contact details and signature of the Applicant.

A permit for exhumation will only be issued if the exhumation is undertaken under the supervision of an archaeologist and after suitable arrangements have been made for the reinterment of the mortal remains. The Applicant will also be held liable for all costs, unless otherwise agreed on in writing between the former and the interested parties.

Due respect for the customs an beliefs of the community associated with the grave must be upheld.

Phase 3 – Exhumation

Phase three of the GRP includes exhumation, relocation and reburial. Established archaeological field and excavation methodologies must be employed during exhumations to recover all the remains, minimise the damage to the remains and record the context of the burial. In addition, a registered funeral undertaker must be appointed to transport an reinter the remains. Where applicable local municipal by-laws concerning graves must be complied with.

5.4.5 Residual Impact (Post-mitigation) to Site S.36-007

The site will be relocated so there is no residual impact on the physical site location. However, residual impacts on the descendants and/or community (receptors) may occur. Such impacts may manifest as specific social impacts that are not discussed here.

6 CUMULATIVE IMPACTS AND MITIGATION

6.1 INTRODUCTION

Cumulative impacts are those impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the proposed Project. Cumulative impacts are therefore generally impacts that act with others in such a way that the sum is greater than the parts. This is, however, not always the case – sometimes they will simply be the sum of the parts, but that sum becomes significant.

This chapter considers the cumulative impacts that would result from the combination of the Maquasa Mine Expansion Project.

6.2 IDENTIFIED CUMULATIVE IMPACTS

Cumulative impacts are those impacts that act together to affect the same heritage resource.

Increased development in the greater Study Area will have a number of cumulative impacts on heritage resource. For example, tourism and mining could, over the long term, increase human activity that could change, alter or destroy heritage resources.

Other identified cumulative impacts would result from the Maquasa Mine Expansion Projects. The development of the proposed Project and the continual mining at the Savmore Colliery through Maquasa East, Maquasa West, and Maquasa West Extension, would result in cumulative impacts on heritage resources.

Cumulative impacts that could result from a combination of the proposed Project and other actual or proposed future developments in the broader Study Area include:

- **Site Clearance and the Removal of Topsoil** – could result in damage to or the destruction of heritage resources that have not previously been recorded. Heritage resources such as burial grounds and graves and archaeological and historical sites are common occurrences within the greater Study Area. These sites are often not visible and as a result, can be easily affected/lost.

- **Increased Human Activity** – allows increased access to nearby heritage resources. Furthermore, many heritage resource in the greater Study Area are informal, unmarked and may not be visible, particularly during the wet season when grass cover is dense. As such, construction workers may

not see these resources, which results in increased risk of resource damage and/or loss.

- **Increased Atmospheric Emissions** – the continued operation of the Savmore Colliery and the establishment of the proposed Maquasa Mine Expansion Project together with the Kusipongo Resource Expansion Project may potentially result in increased atmospheric emissions (dust and particulate matter) in the greater Study Area. These emissions could result in a change to the integrity of tangible heritage resources such as rock art sites. Rock art sites can become covered with coal dust which would result in a change to the integrity and authenticity of the heritage resource.

- **Vibrations and Earth Moving Activities associated with Mining** – has the potential to crack/damage rock art covered surfaces, which are known to occur in the greater Study Area.

- **Dewatering of Mine Workings** - has the potential to exfoliate and dry-out rock art sites.

- **Impacts to Paleontological Resources** - no specific paleontological resources were found in the Project Area during the time of this study; however, this does not preclude the fact that paleontological resources may exist within the greater Study Area. As such, future has the potential to impact on possible paleontological resources in the area.

- **Subsidence** - Potential subsidence of existing and proposed underground mine workings, has the potential to result in the collapse of burial ground and graves in the Study Area.

It is recommended that prior to the establishment of future developments in the Study Area (especially green-field developments) that heritage assessments be conducted. These assessments should provide suitable mitigation/management measures that allows for effective preservation and protection of heritage resources in the Study Area that have a medium to high heritage value.

7 CONCLUSION

Kangra Coal commissioned ERM to conduct an ESIA for the proposed Kangra Coal Project in accordance with the NEMA and MPRDA. ERM has subsequently appointed Digby Wells to conduct the HIA for the proposed Project.

Based on the Scoping Report, SAHRA stipulated that a HIA report must be completed and submitted for assessment. The HIA report presented here is, according to ToR received from SAHRA, inclusive of:

- An archaeological assessment that:
    - Identifies all the archaeological resources that may be impacted by the proposed Project;
    - Assesses the significance of all impacts to resources; and
    - Makes recommendations about what mitigation may be required.
- A palaeontological study to indicate whether or not the Project Area is palaeontoloigcally sensitive: if sensitive, a full Palaeontological Report is required.

A total of seven sites were identified and recorded during the vehicle and pedestrian survey conducted during the HIA assessment on 5 to 7 May 2013.

The historical structures S.34-002 and S.34-009 are of **low heritage value**. These structures are bisected by the proposed overland conveyor route and will be impacted on. However, these heritage resources were given a Grade IV B field rating and no Project-related mitigation measures are recommended for these structures. The heritage resources were significantly recorded and mapped.

The archaeological site S.35-006 is of **low heritage value**. The site is bisected by the Main Mine Adit footprint and will essentially be lost. The resource was given a Grade IV B field rating and as a result, no Project-related mitigation measures are recommended for the site. The heritage resource was significantly recorded and mapped.

The burial ground S.36-001 is of **medium heritage value**. The site is located 18m from the proposed overland conveyor route and may be indirectly impacted on. It is therefore recommended that the perimeter of the burial ground be fenced and that detailed design of the conveyor route be such that a 20 m buffer is created between the fenced perimeter of the burial ground and the perimeter of the servitude for the proposed conveyor.

The burial grounds S.36-005 and S.36-008 are of **medium heritage value**. The sites are located between 30 and 82 meters from the proposed overland

conveyor route and could be indirectly impacted on during the construction and operational phases of the proposed Project. As with burial ground S.36-001, it is recommended that the perimeter of the burial grounds be fenced.

A single grave S.36-007 is of **medium heritage value**. The site is located within the Main Mine Adit footprint and and therefore it is certain that the grave will be lost in its entirety. As such, no Project-related mitigation measures such as changes to design or mine plan were considered. It is therefore recommended that this grave be relocated in accordance with the Section 36 of the NHRA and NHRA Regulations.

During the field survey, no surface fossils were identified along the proposed conveyor routes or within the Main Mine Adit and Adit B footprints. Most fossil heritage is embedded within the rocks beneath the land surface or obscured by surface deposits such as alluvium or soil and by vegetation cover. It is therefore recommended that a palaeontologist or geologist be appointed to inspect the palaeontological sensitive sites during the construction and mining phases. This monitoring may be limited to overburden dumps in which fossil material may be deposited with overburden material.

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Appendix A

Curriculum Vitae of Specialists

MS SHAHZAADEE KARODIA

Archaeology Consultant
Social Science Department
Digby Wells Environmental

Education

2006: BA Anthropology & Archaeology, University of the Witwatersrand
2007: BSc Honours Palaeontology, University of the Witwatersrand
2012: Msc Archaeology, University of the Witwatersrand

Language Skills

English (read, write, speak)
Currently completing French training for beginners

Employment

2012: Archaeology consultant, Digby Wells Environmental
April 2012 – June 2012: External archaeology consultant, EcoAfrica
April 2011 – November 2011: Archaeology intern, University of Pretoria
2007 – 2008: Palaeontology collections assistant, BPI, University of the Witwatersrand
2006 – 2007: Tour guide, Sterkfontein caves

Experience

Archaeology field school at Klipriviersberg with Dr Karim Sadr, University of the Witwatersrand
Archaeology field school at Swartkrans and Maropeng with Dr Kathy Kuman, University of the Witwatersrand
Archaeology field school at Ottosdal with Dr Thembi Russell, University of the Witwatersrand
Palaeontology field school in the Karoo with Professor Bruce Rubidge, University of the Witwatersrand
Palaeontology field school at Gladysvale with Professor Lee Berger, University of the Witwatersrand
Palaeontology field school at Wonderkrater with Dr Lucinda Backwell, University of the Witwatersrand

Project Experience

Heritage Statement and Letter of Recommendation from Exemption for the Central Basin, Witwatersrand Acid Mine Drainage Project
Heritage Impact Assessment for the Witwatersrand Gold Fields Acid Mine Drainage Project (Western Basin)

Archaeological Watching Brief on Access Road for Bokoni Platinum Ltd

Heritage Statement and Notification of Intent to Develop for Eskom Transmission Division – Roodepoort Strengthening Project

Heritage Statement and Notification of Intent to Develop for the Zandbaken Coal Mine Project, Zandbaken 585 IR, Sandbaken 363 IR and Bosmans Spruit 364 IS, Standerton, Mpumalanga

Heritage Statement and Notification of Intent to Develop for Rhodium Reef Limited Platinum Operation, 2430 CA & CC, De Goedverwachting 332 KT, Boschkloof 331 KT and Belvedere 362 KT

Heritage Statement and Notification of Intent to Develop for the Thabametsi Project, 2327 CB, Vaalpensloop 313 LQ, Lephalale, Limpopo Province

Heritage Statement and Notification of Intent to Develop for the Dalyshope Project

Heritage Statement and Notification of Intent to Develop for the Harwar Colliery

Heritage Statement and Notification of Intent to Develop for the Consbrey Colliery

Heritage Statement and Notification of Intent to Develop for the Waterberg Prospecting Rights Application

Professional affiliations

Association of Southern Africa Professional Archaeologists (ASAPA)
The South African Archaeology Society (SAAS)
Society of Africanist Archaeologists (SAfA)
The Geological Survey of South Africa (GSSA)
The Palaeontological Society of Southern Africa (PSSA)
The South African Society for Amateur Palaeontologists (SASAP)

MR JOHAN NEL

Unit manager: Heritage Resources Management
Social Sciences
Digby Wells Environmental

Education

2002: BA Honours - Archaeology
2001: BA Anthropology & Archaeology
1997: Matriculated Brandwag Hoërskool

Language Skills

Fluent in English and Afrikaans

Employment

2011 to present: Unit manager: Heritage Resources Management, Digby Wells Environmental
2010-2011: Archaeologist, Digby Wells Environmental
2005-2010: Manager and co-owner, Archaic Heritage Project Management
2003-2005: Freelance archaeologist
Resident archaeologist, Rock Art Mapping Project, Ndidima, Ukhahlamba-Drakensberg World Heritage Site
2002-2003: Special Assistant: Anthropology, Department of Anatomy, University of Pretoria
2001-2002: Technical Assistant: Department of Anatomy, University of Pretoria
1999-2001: Assistant: Mapungubwe Project, National Cultural History Museum & Department of Anthropology and Archaeology, UP

Experience

I have 13 years of combined experience in the field of cultural heritage resources management (HRM) including archaeological and heritage assessments, grave relocation, social consultation and mitigation of archaeological sites. I have gained experience both within urban settings and remote rural landscapes. Since 2010 I have been actively involved in environmental management that has allowed me to investigate and implement the integration of heritage resources management into environmental impact assessments (EIA). Many of the projects since have required compliance with International Finance Corporation (IFC) requirements and other World Bank standards. This exposure has allowed me to develop and implement a HRM approach that is founded on international best practice and leading international conservation bodies such as UNESCO and ICOMOS. I have worked in most South African Provinces, as wells Swaziland, the Democratic Republic of the Congo and Sierra Leone. I am fluent in English and Afrikaans, with excellent writing and research skills.

Project Experience

Phase 1 Archaeological Impact Assessments

Above Ground Storage Tanks survey, SASOL Oil (Pty) Ltd, Free State Province, South Africa

Access road establishment , AGES-SA, Tzaneen, South Africa

Boikarabelo Railway Link, Resgen South Africa, Steenbokpan, South Africa

Conversion of prospecting rights to mining rights, Georock Environmental, Musina, South Africa

Galaxy Gold Agnes Mine, Barberton, South Africa

HCI Khusela Palesa Extension, Bronkhorstspruit, South Africa

Kennedy's Vale township establishment, AGES-SA, Steelpoort, South Africa

Koidu Diamond Mine, Koidu Holdings, Koidu, Sierra Leone

Lonmin Platinum Mine water pipeline survey, AGES-SA, Lebowakgomo, South Africa

Mining right application, DERA Environmental, Hekpoort, South Africa

Mogalakwena water pipeline survey, AGES-SA, Limpopo Province, South Africa

Nzoro Hydropower Station, Environmental and Social Impact Assessment, DRC

Randgold Kibali Gold Project, Environmental and Social Impact Assessment, Kibali, Democratic Republic of the Congo

Randwater Vlakfontein-Mamelodi water pipeline survey, Archaeology Africa cc, Gauteng, South Africa

Residential and commercial development, GO Enviroscience, Schoemanskloof, South Africa

Temo Coal, Limpopo, South Africa

Transnet Freight Line survey, Eastern Cape and Northern Cape, ERM, South Africa

Van Reenen Eco-Agri Development Project, GO Enviroscience, South Africa
Platreef Platinum Mine, Ivanhoe Nickel & Platinum, Mokopane, South Africa

Mitigation of Projects

Mitigation of Iron Age archaeological sites: Kibali Gold Project, DRC

Mitigation of Iron Age metalworking site: Koidu Diamond Mine, Sierra Leone

Mitigation of Iron Age sites: Boikarabelo Coal Mine, South Africa

Exploratory test excavations of alleged mass burial site: Rustenburg, Bigen Africa Consulting Engineers, South Africa

Mitigation of Old Johannesburg Fort: Johannesburg Development Agency (JDA), South Africa

Site monitoring and watching brief: Department of Foreign Affairs Head Office, Imbumba-Aganang Design & Construction Joint Venture, South Africa

Grave Relocation

Du Preezhoek-Gautrain Construction, Bombela JV, Pretoria, South Africa
Elawini Lifestyle Estate social consultation, PGS (Pty) Ltd, Nelspruit, South Africa

Motaganeng social consultation, PGS (Pty) Ltd Burgersfort, South Africa
Randgold Kibali Mine, Relocation Action Plan, Kibali, DRC

Repatriation of Mapungubwe National Park and World Heritage Site, DEAT, South Africa

Smoky Hills Platinum Mine social consultation, PGS (Pty) Ltd Maandagshoek South Africa

Southstock Colliery, Doves Funerals, Witbank, South Africa

Tygervallei. D Georgiades East Farm (Pty) Ltd, Pretoria, South Africa

Willowbrook Ext. 22, Ruimsig Manor cc, Ruimsig, South Africa

Zondagskraal social consultation, PGS (Pty) Ltd,Ogies, South Africa

Zonkezizwe Gautrain, PGS, (Pty) Ltd, Midrand, South Africa

Other Heritage Assessments and Reviews

Heritage Scoping Report on historical landscape and buildings in Port Elizabeth: ERM South Africa

Heritage Statement and Cultural Resources Pre-assessment scoping report on Platreef Platinum Mine, Mokopane: Platreef Ltd

Heritage Statement and Scoping Report on five proposed Photo Voltaic Solar Power farms, Northern Cape and Western Cape: Orlight SA

Land claim research Badenhorst family vs Makokwe family regarding Makokskraal, Van Staden, Vorster & Nysschen Attorneys, Ventersdorp South Africa

Research report on Cultural Symbols, Ministry for Intelligence Services, Pretoria, South Africa

Research report on the location of the remains of kings Mampuru I and Nyabela, National Department of Arts and Culture, Pretoria, South Africa
Review of Archaeological Assessment: Resources Generation, Coal Mine Project in the Waterberg area, Limpopo Province

Review of CRM study and compilation of Impact Assessment report, Zod Gold Mine, Armenia

Professional affiliations

Society for Africanist Archaeologists (SAfA)

Professional Registration

Association fo Southern African Professional Archaeologists (ASAPA)
Accredited by ASAPA Cultural Resources Management section
International Association of Impact Assessors (IAIA)

Publications

Nel, J. 2001. Cycles of Initiation in Traditional South African Cultures. *South African Encyclopaedia* (MWEB).

Nel, J. 2001. *Social Consultation: Networking Human Remains and a Social Consultation Case Study*. Research poster presentations at the Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists: National Museum, Cape Town.

Nel, J. 2002. *Collections policy for the WG de Haas Anatomy museum and associated Collections*. Unpublished. Department of Anatomy, School of Medicine: University of Pretoria.

Nel, J. 2004. Research and design of exhibition for Eloff Belting and Equipment CC for the Institute of Quarrying 35th Conference and Exhibition on 24 – 27 March 2004.

Nel, J. 2004. *Ritual and Symbolism in Archaeology, Does it exist?* Research paper presented at the Bi-annual Conference (SA3) Association of Southern African Professional Archaeologists: Kimberley.

Nel, J & Tiley, S. 2004. The Archaeology of Mapungubwe: a World Heritage Site in the Central Limpopo Valley, Republic of South Africa. Archaeology World Report, (1) United Kingdom p.14-22.

Nel, J. 2007. *The Railway Code: Gautrain, NZASM and Heritage.* Public lecture for the South African Archaeological Society, Transvaal Branch: Roedean School, Parktown.

Nel, J. 2009. *Un-archaeologically speaking: the use, abuse and misuse of archaeology in popular culture*. *The Digging Stick*. April 2009. 26(1): 11-13: Johannesburg: The South African Archaeological Society.

Nel, J. 2011. 'Gods, Graves and Scholars' returning Mapungubwe human remains to their resting place.' In: *Mapungubwe Remembered*. University of Pretoria commemorative publication: Johannesburg: Chris van Rensburg Publishers.

Nel, J. 2012. *HIAs for EAPs*. Paper presented at IAIA annual conference: Somerset West.

Appendix B

Impact Assessment Methodology

The impact assessment stage includes several steps aimed to evaluate the way in which environmental aspects will/may interact with the cultural landscape (the environment) resulting in environmental impacts to heritage resources. Environmental aspects and impacts are defined as:

- *Environmental aspects*: an element of an organisation's activities or products or services that can inteact with the environment' (ISO 14001: 2004 – 3.6); and

- *Environmental impacts*: any change to the environment, whether adverse or beneficial, wholly or partial resulting from an organisation's environmental aspects (ISO 1400: 2004 – 3.7).

However, in terms of cultural heritage resources, environmental impacts should be assessed relative to the heritage value or significance of a resource. The methodology employed in the various stages of the impact assessment process is described in more detail below.

1.1 STATEMENT OF SIGNIFICANCE OR VALUE

Heritage resources – both cultural and natural – are finite, non-renewable and irreplaceable. They characterise community identity and cultures and are therefore are intrinsic to the history and beliefs of communities. As sources of information, heritage resources have inherent potential to contribute significantly to research, education and tourism, as well as allowing capacity for reconciliation, understanding and mutual respect.

Considering the innate value of heritage resources, the foundation of heritage resources management (HRM) is the acknowledgement that heritage resources have lasting worth as evidence of the origins of life, humanity and society. Every generation is therefore morally obligated to act as trustees of heritage for future generations through conservation, preservation and protection.

Accordingly, HRM must take into account rights of affected communities to be consulted and to participate. Where heritage resources are developed and presented the dignity and respect of diverse cultural values must be ensured. In addition, heritage in its broadest sense must never be used for sectarian purposed or political gain.

Notwithstanding the fundamental value ascribed to heritage, significance of individual resources needs to be determined to allow implementation of appropriate management measures. This is achieved through assessing a heritage resource's value relative to certain prescribed criteria, encapsulated in the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) as well as several international conventions. The significance of a resource thus

determines the magnitude of change that may result from environmental impacts. As a result, environmental impacts that are rated low may cause severe change in a heritage resources rated as highly significant. Vice versa, severe impacts may cause negligible change to an insignificant resource. Value is determined by assessing the authenticity and integrity of a resource by applying the formula provided in Table 8. Value thresholds are provided Table 9.

Table 8: Formula calculating heritage resource value

multiplied by		Authenticity					
		0	3	6	9	12	15
Integrity	0	0	0	0	0	0	0
	1	0	3	6	9	12	15
	2	0	6	12	18	24	30
	3	0	9	18	27	36	45

Value = authenticity + integrity
where
Authenticity = importance (average sum of attributes per dimension) + credibility

Table 9: Value thresholds

Score	Description	Rating
0	Resource of no/negligible heritage value as part of national estate	None/negligible
1-15	Resource of low value heritage value: change to resource not significant	Low
16-30	Resource of medium heritage value: project mitigation must aim to reduce any impacts on resource; conservation may be required.	Medium
31-45	Resource of exceptional value and must be considered for inclusion in national estate: project mitigation must attempt to remove all impacts; consideration must be given to conservation/preservation of resource.	High

The steps involved in determining the value of a heritage resource is described in more detail below.

1.1.1 Authenticity

The Nara Document on Authenticity (1993) forms the basis of determining authenticity. Based on this document, it is accepted that understanding and determining importance attributed to heritage resources rely on credible information sources[1]. These sources need to be assessed as credible or truthful. This requires knowledge and understanding of information sources employed in relation to original and subsequent characteristics of heritage resources, and their meaning.
Authenticity is therefore determined in terms of the importance of a resource considering available sources of information. Thresholds for authenticity are provided in Table 10.

[1] **Information sources** are defined as all physical, written, oral, and figurative sources, which make it possible to know the nature, specificities, meaning, and history of the cultural heritage. Therefore, determining authenticity of a resource requires a sound knowledge of the type of heritage resource as well as the context within which occurs – the cultural landscape. This knowledge must be gained through a detailed baseline that must aim to contextualise the resource. Information that should be considered are published, peer reviewed literature, archival research, popular publications, and any other information source that may be relevant (Nara Document on Authenticity, 1993)

Table 10: Authenticity thresholds

Score	Description	Rating
0	None	None/negligible
1-5	Negligible to low level of authenticity evident.	Low
6-10	Authenticity merely evident: importance illustrated in credible information sources.	Medium
11-15	Authenticity of resource undisputed.	High

Importance

The importance of a heritage resource is determined on four dimensions – aesthetic, historic, scientific, and social. In turn, each dimension is measured against one or more descriptive attributes, defined in national legislation and international convention: NHRA (1999), the United Nations Education, Scientific and Cultural Organisation (UNESCO) World Heritage Convention (1972), International Council on Monuments and Sites (ICOMOS) Guidance on Heritage Impact Assessments for Cultural World Heritage Properties and the Australian ICOMOS Charter for Places of Cultural Significance (1999) (Burra Charter). These attributes, or criteria, are aimed to provide a guide as to whether a resource should be included in the national estate as defined in these documents and presented in Table 11 below.

Table 11: Summary of dimensions and attributes

Dimension		Attributes considered	NHRA Ref.	UNESCO Ref.
Aesthetic & technical	1	Importance in aesthetic characteristics	S.3(3)(e)	Appendix 3A
	2	Degree of technical / creative skill at a particular period	S.3(3)(f)	Appendix 3A
Historical importance & associations	3	Importance to community or pattern in country's history	S.3(3)(a)	Appendix 3A
	4	Site of significance relating to history of slavery	S.3(3)(i)	Appendix 3A
	5	Association with life or work of a person, group or organisation of importance in the history of the country	S.3(3)(h)	Appendix 3A
Information potential	6	Possession of uncommon, rare or endangered natural or cultural heritage aspects	S.3(3)(b)	Appendix 3A
	7	Information potential	S.3(3)(c)	Appendix 3A
	8	Importance in demonstrating principle characteristics	S.3(3)(d)	Appendix 3A
Social	9	Association to community or cultural group for social, cultural or spiritual reasons	S.3(3)(g)	Appendix 3A

Importance ratings need to be provided for each applicable attribute per dimension. Each dimension's ratings are averaged and rounded off to allow a consistent rating irrespective of whether one or more attributes are considered. Definitions and ratings are provided in

Table 12 below.

Table 12: Importance definitions

Importance	
0	None
1	Attributes considered commonplace, well or over represented; Importance generally not considered by any community
2	Attributes considered uncommon, underrepresented; Importance generally considered by some communities.
3	Attributes considered singular, unique, irreplaceable; Importance always considered by most communities.

Credibility

Credibility of information sources forms the basis in determining the importance of heritage resources. The importance rating per dimension and attribute discussed above is thus intrinsically linked to the credibility of

information sources used. Credibility thresholds and definitions are provided in Table 13 below.

Table 13: Credibility definitions

Credibility	
0	Credibility of information cannot be determined: Conjecture, unverified personal opinions; biases evident.
1	Secondary and tertiary information sources: Popular media, newspapers, magazines; 'Information' websites e.g. Wikipedia, etc.; Individual opinions.
2	Credible secondary sources: Factually correct textbooks and popular publications, etc.; Official websites; Verifiable oral accounts.
3	Highly credible information sources: Peer-reviewed publications; Primary sources; Verified oral accounts.

1.1.2 Integrity

Integrity is determined by examining the physical condition of a heritage resource – as witnessed at the time of assessment – compared to an ideal or other existing example. Integrity ought to be assessed only after the resource's authenticity has been determined, as the information source/s used should provide comparative examples against which its present condition may be measured. Thresholds and definitions for integrity are described in Table 14 below.

Table 14: Integrity definitions

Integrity	
0	Resource degraded to extent where no information potential exists; resource cannot be restored; single, isolated find, without any site context;
1	Poor condition, active decay visible; excessive restoration required; little information potential
2	Fair to good condition; well preserved; some decay present; can be easily restored/conserved/preserved; good information potential
3	Excellent/pristine; extremely well preserved; little to no decay present; little restoration required/restoration will greatly enhance resource; excellent information potential

1.2 IMPACT ASSESSMENT

Assessing environmental impacts on heritage resources are based first on the value of a resource and second how that value may change due to environmental aspects. Environmental management systems employ relative standard terminology that characterises impacts. This terminology has been adapted to provide a well-defined descriptive terminology for use in assessing environmental impacts on heritage resources summarised in Table 15.

Table 15: Impact characteristic terminology

Characteristic	Description	Designation
Type	Relationship of an assumed impact to a heritage resource (in terms of cause and effect).	Direct Indirect Induced
Scale of change	The physical area (size) of a heritage resource that may change	None Isolated parts / aspects will change Large parts / aspects will change Most or entire resource will change
Duration	Time period over which resource will change	Immediate, non-permanent and fully reversible Long-term, non-permanent and reversible Long-term, permanent and irreversible Immediate, permanent and irreversible
Intensity	How an impact could change the authenticity and integrity, thus importance, of a resource	None Change in integrity without affecting authenticity Change in integrity will affect aspects of authenticity Change in integrity will affect overall authenticity
Probability	Likelihood of change occurring	None Project-related mitigation will remove change Project-related mitigation will reduce change Project-related mitigation will not reduce change

The significance of change to heritage resources due to environmental impacts is determined as follows:

Impact significance = Value x Magnitude

where

Magnitude = Consequence x Probability

and

Consequence = Spatial Scale + Duration + Intensity

The impact rating is applied to pre- and post-mitigation scenarios. The ideal is to remove all impacts to a heritage resource. Where post mitigation significance is not zero, the recommended field rating (heritage) mitigation must be undertaken. The tables below provide the various descriptions and thresholds applicable to the impact assessment ratings.

Table 16: Scale thresholds, definitions and designation

Score	Description	Rating
0	No change	None

1	Isolated parts/aspects of heritage resource will be affected	Low
2	Large parts/aspects of heritage resource will be affected	Medium
3	Most or entire heritage resource will be affected	High

Table 17: Duration thresholds, definitions and designation

Score	Description	Rating
0	Change will be immediate, non-permanent and fully reversible	None
1	Change will occur over the long term, result will be non-permanent and reversible	Low
2	Change will occur over the long term, result will be permanent and irreversible	Medium
3	Change will be immediate, permanent and irreversible	High

Table 18: Intensity thresholds, definitions and designations

Score	Description	Rating
0	No change to integrity and authenticity	None
1	Change to integrity that will not cause any change in authenticity (importance).	Low
2	Change to integrity that will cause change to certain authentic aspects (importance) (describe and define aspects).	Medium
3	Change to integrity that will cause change to overall authenticity (importance)	High

Table 19: Probability thresholds, definitions and designations

Score	Description	Rating
0	No change	None
1	Project-related mitigation measures will avoid change	Unlikely
2	Project-related mitigation measures will reduce change	Probable
3	Project-related mitigation measures will not avoid change	Certain

Table 20: Magnitude of change thresholds, designations and definitions in relation to three categories of heritage resources

Score	Designation	Archaeology, Palaeontology	Built Environment/Structures	Historic Landscape
0	**No change**	No change	No change to fabric or setting	No changes to landscape elements, parcels or components; no visual or audible changes; no changes in amenity or community factors.
1-49	**Low**	Very minor changes to key archaeological materials, or setting.	Slight changes to historic building elements or setting that hardly affect it.	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise or sound quality; very slight changes to use or access; resulting in very small change to historic landscape character.
50-98	**Medium**	Changes to key archaeological materials, such that the resource is slightly altered; slight changes to the setting.	Change to key historic building elements, such that the resource is slightly different; change to setting of an historic building, such that it is noticeably changed.	Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of the historic landscape; limited changes in noise or sound quality; slight changes to use or access; resulting in limited changes to historic landscape character.
99-147	**High**	Changes to many key archaeological materials, such that the resource is clearly modified; changes to	Change to many key historic building elements, such that the resource is significantly modified; change to	Change to many key historic landscape elements, parcels or

Score	Designation	Archaeology, Palaeontology	Built Environment/Structures	Historic Landscape
		the setting that affect the character of the asset	setting of an historic building, such that it is significantly modified.	components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
		Changes to attributes that convey outstanding national value of national estate; Most or all key archaeological materials, including those that contribute to ONV such that the resource is totally altered; comprehensive changes to setting	Change to key historic buildings that contribute to outstanding national value of national estate such that the resource is totally altered; Comprehensive changes to setting.	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit and loss on outstanding national value.

1.3 FIELD RATING (SOUTH AFRICAN PROJECTS)

Field ratings, or proposed grading of heritage resources, are required by the South African Heritage Resources Agency (SAHRA) in terms of Section 7(1) of the NHRA. Field ratings are based on the assessments of heritage resources in relation to criteria contained in Section 3(3) of the NHRA (see above). Section 7 further outlines a three-tier system for heritage resources management of the national estate based on proposed grading:

- National: SAHRA is responsible for identification and managing of Grade I heritage resources;
- Provincial: Provincial Heritage Resources Authorities (PHRAs) are responsible for identification and managing of Grade II heritage resources; and

- Local: Local authoritis (municipalitys, metros, local government) are responsible for identification and managing of Grade III heritage resources.

Field ratings are based on (equal to) the value of a heritage resource. The thresholds for field ratings are present in Table 21 below.

Table 21: Field rating thresholds and descriptions

NHRA SECTION 7 GRADING			
Score	**Grade**	**Protection**	**Recommended Heritage Mitigation**
41-45	Grade I	National	Heritage resource should be nominated as a National Site/Object, included in National Estate
36-40	Grade II	Provincial	Heritage resource should be nominated as a Provincial Site/Object, included in National Estate
31-35	Grade III A	Local	Heritage resource should be nominated as a Regional Site/Object, included in National Estate
16-30	Grade III B	Local	The heritage resource must be mitigated and partly conserved/preserved
8-15	Grade IV A	General	The heritage resource must be mitigated before destruction
1-7	Grade IV B	General	The heritage resource must be recorded before destruction
0	Grade IV C	General	No mitigation required - application for destruction permit

Appendix C

Chance Find and Fossil Find Procedures

1 CHANCE FIND AND FOSSIL FIND PROCEDURES

1.1 CHANCE FINDS PROCEDURES FOR HERITAGE RESOURCES

The following procedures must be considered in the event that previously unknown heritage resources, including burial grounds or graves, are exposed or found during the life of the project (extracted and adapted from the National Heritage Resources Act, 1999 Regulations Reg No. 6820, GN: 548).

List of Acronyms

CRM	Cultural Resources Management
HIA	Heritage Impact Assessment
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Authority
SAPS	South African Police Service

For simplicity, the term 'heritage resource' includes burial grounds and graves, unless these are specifically addressed.

Heritage Resources: structures, archaeology, palaeontology, meteors, public monuments

1. The heritage resource must be avoided and all activities in the immediate vicinity temporarily ceased;
2. The Digby Wells Environmental (Digby Wells) project manager and/or Cultural Resources Management (CRM) Unit must be notified of the discovery;
3. Digby Wells will deploy a qualified specialist to consider the heritage resource, either via communicating with the Environmental Officer via telephone or email, or based on a site visit;
4. Appropriate measures will then be presented to Kangra Coal (Pty) Ltd;
5. Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA (1999) Sections 34, 36, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), Digby Wells will notify the South African Heritage Resources Agency (SAHRA) and/or the Mpumalanga Provincial Heritage Resources Agency (MPRHA) on behalf of Kangra Coal (Pty) Ltd; and
6. SAHRA/MPHRA may require that a Heritage Impact Assessment (HIA) in terms of NHRA Section 38 must take place that may include rescue excavations, for which Digby Wells will submit costs and proposal as relevant.

Burial grounds and graves

1. In the event that human remains were accidently exposed, the Digby Wells project manager and/or the CRM Unit must immediately be notified of the discovery in order to take the required further steps:

a. The local South African Police Service (SAPS) will be notified on behalf of Kangra Coal (Pty) Ltd;
b. Digby Wells will deploy a suitably qualified specialist to inspect the exposed burial and determine in consultation with the SAPS whether:

i. The temporal context of the remains, i.e.:
- forensic,
- authentic burial grave (informal or older than 60 years, NHRA (1999) Section 36); or
- archaeological (older than 100 years, NHRA (1999) Section 38).

ii. Any additional graves may exist in the vicinity.

2. Should the specialist conclude that the find is a heritage resource protected in terms of the NHRA (1999) Section 35 and NHRA (1999) Regulations (Regulation 38, 39, 40), Digby Wells will notify SAHRA and/or MPHRA on behalf of Kangra Coal (Pty) Ltd;
3. SAHRA/MPHRA may require that an identification of interested parties, consultation and /or grave relocation take place;
4. Consultation must take place in terms of NHRA (1999) Regulations 39, 40, 42;
5. Grave relocation must take place in terms of NHRA (1999) Regulations 34

Digby Wells can facilitate and assist with all chance find procedures outlined above.

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1.2 FOSSIL FIND PROCEDURES

List of Acronym

ECO	Environmental Control Officer

1.2.1 Introduction

In the context under consideration, it is improbable that fossil finds will require declarations of permanent "no go" zones. At most, a temporary pause in activity at a limited locale may be required. The strategy is to rescue the material as quickly as possible.

The procedures suggested below are in general terms, to be adapted as befits a context. They are described in terms of finds of fossil bones that usually occur sparsely. However, they may also serve as a guideline for other fossil material that may occur.

Bone finds can be classified as two types: isolated bone finds and bone cluster finds.

1.2.2 Isolated Bone Finds

In the process of digging excavations, isolated bones may be spotted in the hole sides or bottom, or as they appear on the spoil heap. By this is meant bones that occur singly, in different parts of the excavation. If the number of

distinct bones exceeds six pieces, the finds must be treated as a bone cluster (below).

1.2.3 Response by personnel in the event of isolated bone finds

The following responses should be undertaken by personnel in the event of isolated bone finds:

- Action 1: An isolated bone exposed in an excavation or soil heap must be retrieved before it is covered by further soil from the excavation and set aside;

- Action 2: The site foreman and Environmental Control Officer (ECO) must be informed;

- The responsible field person (site foreman or ECO) must take custody of the fossil. The following information is to be recorded:

    - Position (excavation position)
    - Depth of find in hole;
    - Digitial image of hole showing vertical section (side); and
    - Digital image of fossil.

- Action 4: The fossil should be placed in a bag (e.g. a Ziploc bag), along with any detachment fragments. A label must be included with the date of the find, position information, and depth; and

- Action 5: The ECO is to inform the developer who then contacts the archaeologist and/or palaeontologist contracted to be on standby. The ECO is to describe the occurrence and provide images via email.

1.2.4 Response by Palaeontologist in the event of isolated bone finds

The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established.

1.3 BONE CLUSTER FINDS

A bone cluster is a major find of bones (e.g. several bones in close proximity or bones resembling parts of a skeleton). These bones will likely be seen in broken sections of the sides of the hole and as bones appearing in the bottom of the hole and on the spoil heap.

1.4 RESPONSE BY PERSONNEL IN THE EVENT OF A BONE CLUSTER FIND

The following responses should be undertaken by personnel in the event of bone cluster finds:

- Action 1: Immediately stop excavation in the vicinity of the potential material. Mark or flag the position as well as the soil heap that may contain fossils;

- Action 2: Inform the sie foreman and the ECO; and

- Action 3: The ECO is to inform the developer who must then contact the archaeologist and/or palaeontologist contracted to be on standby. The ECO is then to describe the occurrence and provide images via email.

1.5 RESPONSE BY PALAEONTOLOGIST IN THE EVENT OF A BONE CLUSTER FIND

The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established. It is likely that a Field Assessment by the palaeontologist will be carried out.

It will be probably be feasible to avoid the find and continue to the excavation farther along, or proceed to the next excavation, so that the work schedule is minimally disrupted. The response time/scheduling of the Field Assessment is to be decided in consultation with the developer/owner and the environmental consultant.

The Field Assessment could have the following outcomes:

- If a human burial, the appropriate authority is to be contacted. The find must be evaluated by a human burial specialist to decide in Rescue Excavation is feasible, or if it is a Major Find;

- If the fossils are in an archaeological context, an archaeologist must be contacted to evaluate the site and decide if Rescue Excavation is feasible, or if it is a Major Find; and

- If the fossils are in a palaeontological context, the palaeontologist must evaluate the site and descide if Rescue Excavation is feasible, or of it is a Major Find.

1.6 RESCUE EXCAVATION

Rescue Excavation refers to the removal of the material from the "design" excavation. This would apply if the amount or significance of the exposed material appears to be relatively circumscribed and it is feasible to remove it without compromising contextual data. The time span for Rescue Excavation should be reasonable rapid to avoid any undue delays, e.g. one to three days and definitely less than one week.

In principle, the strategy during the mitigation is to "rescue" the fossil material as quickly as possible. The strategy to be adopted depends on the nature of the occurrence, particularly the density of the fossils. The methods of collection would depend on the preservation or fragility of the fossil and whether in loose or in lithified sediment. These could include:

- On-site selection and sieving in the case of robust material in sand; and

- Fragile material in loose sediment would be encased in blocks using Plaster-of-Paris or reinforced mortar.

If the fossil occurrence is dense and is assessed to be a "Major Find", a carefully controlled excavation is required.

1.7 MAJOR FINDS

A Major Find is the occurrence of material that, by virtue of quantity, importance and time constraints, cannot be feasibly rescued without compromise of detailed material recovery and contextual observations.

1.7.1 Management Options for Major Finds

In consultation with the developer/owner and the environmental consultant, the following options should be considered when deciding on how to proceed in the event of a Major Find.

Option 1: Avoidance

Avoidance of the Major Find through project redesign or relocation. This ensures minimal impact to the site and is the preferred option from a heritage resource management perspective. When feasible, it can also be the least expensive option from a construction perspective.

The find site will require site protection measures, such as erecting fencing or barricades. Alternatively, the exposed finds can be stabilised and the site refilled or capped. The latter is preferred if excavation of the find will be delayed substantially or indefinitely. Appropriate protection measures should be identified on a site-specific basis and in wider consultation with the heritage and scientific communities.

This option is preferred as it will allow the later excavation of the finds with due scientific care and diligence.

Option 2: Emergency Excavation

Emergency excavation refers to the "no option" situation where avoidance is not feasible due to design, financial and time constraints. It can delay construction and emergency excavation itself will take place under tight time constraints, with the potential for irrevocable compromise of scientific quality. It could involve the removal of a large, disturbed sample by an excavator and conveying this by truck from the immediate site to a suitable place for "stockpiling". This material could then be processed later.
Consequently, the emergency excavation is not the preferred option for a Major Find.

1.8 EXPOSURE OF FOSSIL SHELL BEDS

1.8.1 Response be personnel in the event of intersection of fossil shell beds

The following responses should be undertaken by personnel in the event of intersection with fossil shell beds:

- Action 1: The site foreman and ECO must be informed;

- Action 2: The responsible field person (site foreman or ECO) must record the following information:

    - Position (excavation position)
    - Depth of find in hole;
    - Digitial image of hole showing vertical section (side); and
    - Digital image of fossiliferous material.

- Action 3: A generous quantity of the excavated material containing the fossils should be stockpiled near the site for later examination and sampling; and

- Action 4: The ECO is to inform the develop who must then contact the archaeologist and/or palaeontogist contracted to be on standby. The ECO is to describe the occurrence and provide images via email.

1.8.2 Response by the palaeontologist in the event of fossil shell bed finds

The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.

1.9 EXPOSURE OF FOSSIL WOOD AND PEATS

1.9.1 Response be personnel in the event of exposure of fossil wood and peats

The following responses should be undertaken by personnel in the event of exposure of fossil wood and peats:

- Action 1: The site foreman and ECO must be informed;

- Action 2: The responsible field person (site foreman or ECO) must record the following information:

    - Position (excavation position)
    - Depth of find in hole;
    - Digitial image of hole showing vertical section (side); and
    - Digital image of fossiliferous material.

- Action 3: A generous quantity of the excavated material containing the fossils should be stockpiled near the site for later examination and sampling; and

- Action 4: The ECO is to inform the develop who must then contact the archaeologist and/or palaeontogist contracted to be on standby. The ECO is to describe the occurrence and provide images via email.

1.9.2 Response by the palaeontologist in the event of exposure of fossil wood and peats

The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.